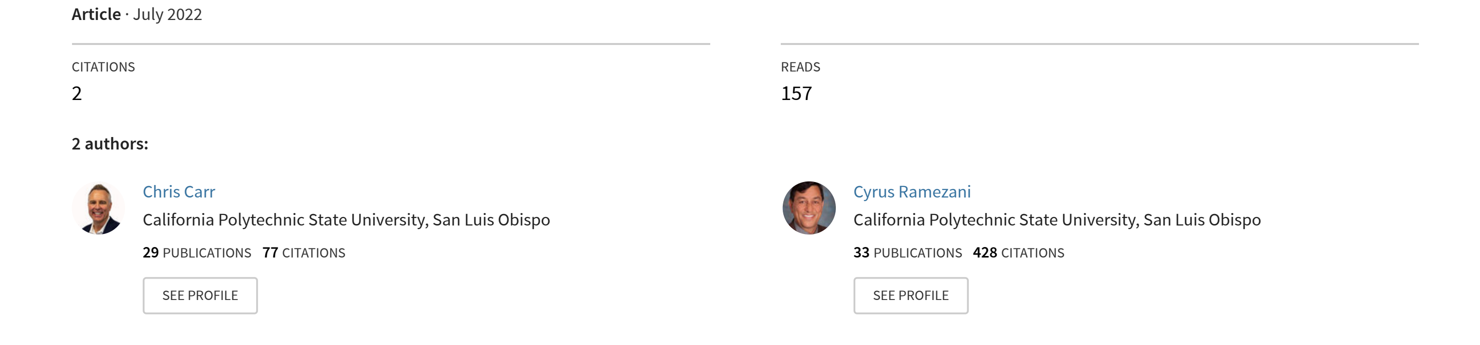
APIs: The (Potential) Digital Connectivity Accelerant For Small and Medium-Sized Importers, Exporters and Their Logistics Providers (Journal of Transportation Law, Logistics and Po...

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APIS: THE (POTENTIAL) DIGITAL CONNECTIVITY ACCELERANT FOR SMALL AND MEDIUM-SIZED IMPORTERS, EXPORTERS AND THEIR LOGISTICS PROVIDERS

By Chris Carr, J.D. & Cyrus Ramezani, Ph.D.[1]

Abstract

We are entering a period of dynamic and fundamental change in the logistics industry. The communication and collaborative aspects of the Internet are changing the way firms develop their logistics strategies, processes, and systems. Internet and digital technologies help facilitate information sharing and logistics synchronization between trading partners and service providers. This includes the use of APIs (applied program interfaces). Companies that embrace the API paradigm and the opportunity it presents can lower operating costs, achieve better logistics and supply chain integration, and increase market power through customer-focused fulfillment. Successful (large company) examples in this regard include Amazon, Target, Coca-Cola, Walmart, Costco, Apple, Ford, ExxonMobil, Cargill, Proctor & Gamble, as well as delivery companies such as UPS and FedEx.

However, what about small and medium-sized importers and exporters and their logistics providers? Are these often under-resourced firms keeping up with such changes and opportunities? If not, why not? To date, the study of digital technology change and API utilization as it applies to small and medium-sized importers and exporters has been ignored by the logistics and supply chain research and literature. To help address this gap, this article describes the fragmentation and ongoing evolution of this logistics and digital technology landscape. We also identify and analyze the various parties who supply logistics data to this ecosystem. Finally, the article explains how APIs

[1] Chris Carr, J.D. (ccarr@calpoly.edu) and Cyrus Ramezani, Ph.D. (cramezan@calpoly.edu) are professors in the Orfalea College of Business at California Polytechnic State University, San Luis Obispo.

work and can help mitigate the data isolation experienced by such importers and exporters, including the utilization of legal tools such as Terms of Service and API License Agreements to manage corresponding legal risk.

Key Words: Importers, Exporters, Logistics, Supply Chain, Enterprise Resource Planning Systems, Transportation Management Systems, Warehouse Management Systems, APIs, Freight Visibility, Terms of Service, API License Agreements

I. INTRODUCTION

> *Everyone talks data, data, data, but in a field as fragmented as logistics, the underlying issue is data access and accuracy. And if the 'plumbing' infrastructure is bad (or non-existent), the data itself is effectively worthless.*
>
> *- Executive Vice President at an AI & Machine Learning Logistics Startup*[2]

New data acquisition and information sharing technologies are expected to play a major role in enhancing cargo velocity, visibility and traceability through such steps as improving the positioning and movement of trucks, containers, chassis, rail cars, and other equipment critical to the movement of containerized cargo. Recent examples of several leading technologies include:

- Marine terminal, trucker, and equipment reservation systems;
- Smart (IoT) tracking devices installed on chassis and containers which gather spatial and environmental data in real time; and
- Online and API (applied program interface) based sharing of information related to shipments, logistics, and transportation conditions (e.g., traffic information, wait time at terminal gates, turn times at the ports, container

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[2] *See* Eric Johnson, *The Data-Sharing Reverb*, THE LOGTECH LETTER (February 8, 2021), https://ericjohnson.substack.com/p/the-data-sharing-reverb?utm_campaign=post&utm_medium=facebook&utm_source=dlvr.it.

and chassis location) through early stage common portals and cloud-based data sharing platforms.[3]

These new technologies seek to increase efficiency by mitigating or removing bottlenecks in the intermodal logistics system. However, in the import and export verticals, stakeholders indicate that the lack of APIs and other information sharing systems by the various stakeholders in the system adversely impact operational efficiency and profitability. While it is clear that data is widely collected by BCOs (*which we define herein as importers and exporters and their shippers*), truckers and drayage operators, 3PLs, freight forwarders, chassis providers, ocean carriers, ports and marine terminals - these stakeholders all concede that their ability to effectively gather, analyze and leverage each other's data to improve system efficiency and their own profitability, is lagging.[4]

Then there is the "non-proprietary data" that is also collected and critical to the smooth operation of the transportation and logistics system. For example, this data includes the regulatory information gathered by international organizations (IMO), U.S. federal, state, and local governments (e.g., via Electronic Logging Devices), the U.S. Customs and Border Protection and

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[3] APIs offer the ability to connect equipment with digital signals. The advantages of APIs include ease of implementation, ability to efficiently exchange information at high speeds, and cost effectiveness. We discuss APIs in Section VI below. For a solid resource to monitor API developments as they apply to startups and logistics, *see* JOURNAL OF COMMERCE Technology Section at https://www.joc.com/technology.

[4] For examples of logistics costs associated with inaccurate logistical data, *see* William B. Cassidy, *'Broken' maps add to logistics costs: survey*, JOURNAL OF COMMERCE (Feb. 11, 2020), https://www.joc.com/technology/logistics-technology-providers/'broken'-maps-add-logistics-costs-survey_20200211.html. We also note that the sharing of data is less of a problem in certain areas of import/export than others. For example, for refrigerated containers ("reefers") in the containerized agricultural value chain, reefer fleet operators report significant data sharing and efficiency gains from the adoption of digital technologies that enable the sharing of data. *See, e.g.*, *Raising the Bar for Reefer Monitoring*, TRANSPORT TOPICS (May 24, 2019), https://www.ttnews.com/articles/raising-bar-reefer-monitoring. This exception is likely because the value and margins of such agricultural goods are large enough to justify the use of IoT and other data gathering devices and technologies on/inside the reefers that move them.

Transportation Departments, and the U.S.D.A. (e.g., in the case of agricultural imports and exports, data is collected and reported under the Food Safety Modernization Act)—all of which are public data. Then we also have the data collected by "quasi-public" entities, such as ports, terminals, and railroads—e.g., the data they gather and publish on dwell and turn times, congestion and port conditions, vessel arrival and departure data, road, and rail conditions.[5]

Thus, in the aggregate, the logistics ecosystem generates massive "big data" in real time, but that data needs to be shared, managed and leveraged in order to improve efficiency and create value. Numerous data analytic firms (mostly startups) purport to enable various stakeholders to derive predictive intelligence from their data by utilizing artificial intelligence, machine learning and publicly maintained ledger systems (Blockchain), in conjunction with cloud based digital platforms—all with the goal of achieving efficiency and delivering added value.[6]

One benefit of integrated digital technologies is that they can lead to more competitive economic outcomes by providing market transparency. For example, stakeholders can shop for equipment costs and freight rates online. Carriers, shippers, 3PLs, and freight-forwarders can also submit and obtain quotes and book capacity electronically, thereby reducing or eliminating

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[5] As noted in *Container News*, "Technology infrastructure also was a key theme of [Port of Los Angeles Director] Seroka's remarks as the Port works to accelerate digital transformation of the supply chain by creating a port community system to connect critical cargo data points. The Port continues to be recognized as one of the nation's leading digital "Smart Ports" with its Port Optimizer™ online information portal continuing to gain ground. The system covers 95% of all the containerized cargo flowing through the port. Nine of the 10 leading carriers are feeding data into the Port Optimizer, and Wabtec, the Port's digital partner in development of the Port Optimizer is now exploring end-to-end supply chain data integration with leading blockchain providers." *See LA Port moved near record-cargo last year*, CONTAINER NEWS (Jan.17, 2020), https://container-news.com/la-port-near-record-cargo-last-year/.

[6] Amazon, Walmart, Target, Coca-Cola, Apple, Ford, ExxonMobil, Cargill, Proctor &Gamble, Costco, as well as delivery companies such as UPS and FedEx, are examples of companies implementing best practices in the adoption of digital technologies that improve logistical efficiency and enhance profitability.

overbooking and no-shows. Better information sharing and visibility can also improve risk assessment and bring about better “financial engineering,” creating new tools that tie transportation and logistics data directly to the financing of assets, and lowering financing costs for this capital intensive industry. More reliable data on equipment utilization on marine chassis, for example, could lead to improved lease and financing options, lower equipment insurance costs, lower maintenance and repair contract costs, all leading to higher return on capital investments.

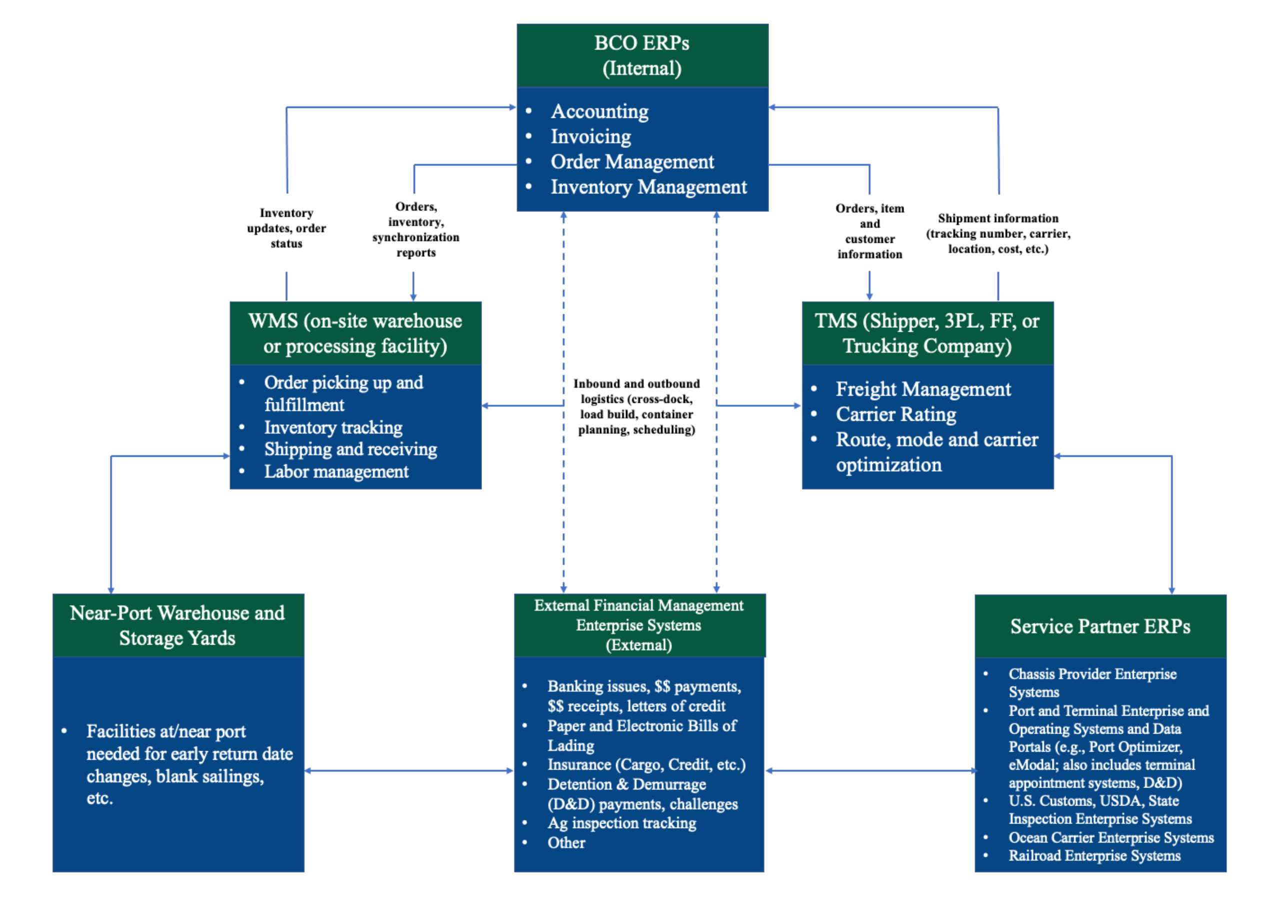
Reaching optimal efficiency in this ecosystem, however, requires that various stakeholders in the import and export value chain move from relying on the “legacy technologies” of the past toward the adoption of software-as-a-service (SaaS) and cloud-based logistics technologies. It also requires that they break down internal and external barriers and share data with other parties, including their competitors. In theory, sharing data, including potentially proprietary information, can lead to greater collaboration in real-time decision making, leading to more optimal decisions and a virtuous circle in the form of a truly data-driven supply chain. In practice, however, and as we highlight in this article, data sharing by and among small and medium-sized importers and exporters and the logistics providers they partner with is piecemeal and in many cases is lacking.

II. HOW ENTERPRISE RESOURCE PLANNING, TRANSPORTATION MANAGEMENT, AND WAREHOUSE MANAGEMENT SYSTEMS CONNECT (OR DON’T) WITHIN THE IMPORT-EXPORT VALUE CHAIN

ERPs, TMSs and WMSs each play an important role in the logistics chain. APIs (application program interface) and EDIs (electronic data interchange) integration between these enterprise systems is what enables the sharing of certain data and standard documents that are necessary for efficiently getting the right import or export container to the right service provider or customer at the right time. **Figure 1** shows how, in theory, these three enterprise systems should be connected to and communicate with each other. For example, in the case of TMSs, data from the chassis providers, ports,

terminals, ocean carriers, railroads, and government inspection enterprise systems are needed to smoothly move a container from point A to B. In the case of WMSs, it may not be enough for the trucker to only be connected to the exporter's on-site processing facility and warehouse. If the Early Return Date is changed by the ocean carrier at the last minute, the trucker will need access to a third-party warehouse or storage yard located near the port to drop off the container until it can be loaded onto the vessel. In the case of BCOs, while their internal ERPs may do an acceptable job handling internal accounting, invoicing and order management issues, they also need to be connected to and communicate with the *external* ERPs of the banks and insurance companies who finance and insure the import-export.

Figure 1: Logistics - The Enterprise Ecosystem



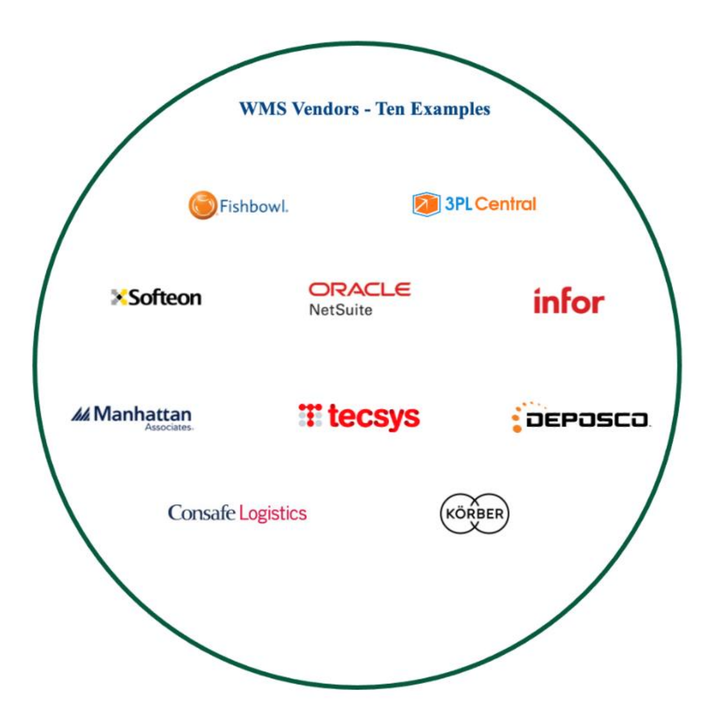
A. The Function of ERP, TMS and WMS Systems

<u>ERPs</u>: Enterprise Resource Planning systems (ERPs) are a suite of software modules that integrate back to the financial side of the business because most firms, regardless of whether it is in manufacturing, pharmaceuticals, consumer goods, agriculture or other, must track and report its financials to other stakeholders and the taxing authorities. ERPs therefore commonly focus on handling a firm's (internal) accounting, invoicing, order

management, inventory management, payroll, and for some firms, logistics. And then based on the type of industry the firm operates in, it selects the modules that best support its business model. For example, if the firm is an agricultural grower or a logistics company who supports such growers, it will select different modules than a retail company. All of this emanates from an earlier system and time period. ERP was first coined as a phrase in the mid-1990s. It comes from the material requirements planning (MRP) and MRP2 systems that were created starting in the early 1960s. Software was developed in the '70s and '80s and then a growth explosion took place in that industry in the '80s and '90s. Today, most companies operating in the import-export space have some type of an ERP system.

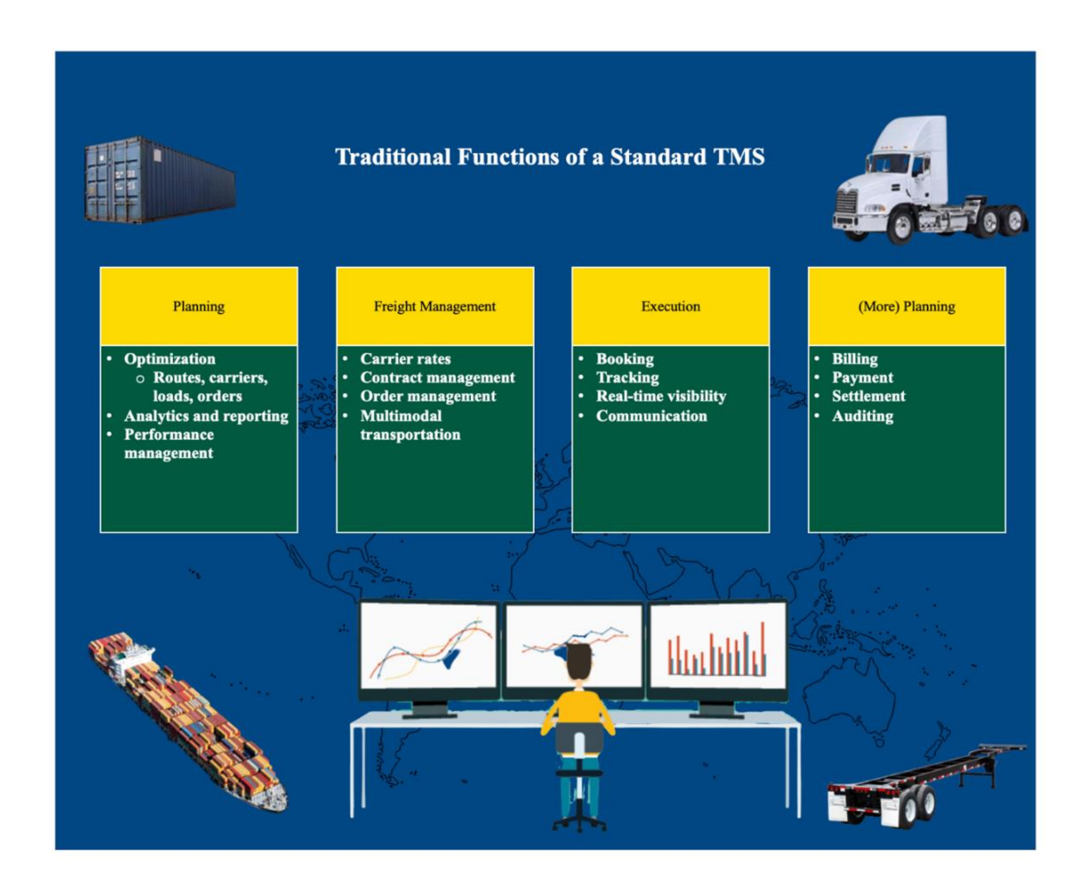
WMSs: Warehouse Management Systems (WMSs) are available as standalone software or as modules within an ERP (**Figure 2**). Regarding exports in particular, WMSs help BCOs and logistics providers manage the arrival, storage, loading, and departure of their containers (and chassis) from the warehouse facility at their own processing center. But again, in some instances the logistics provider/trucker learns, while the container is in transit from the processing facility to the port, that the vessel carrying the export container to the foreign port will arrive late or has canceled its arrival (blank sailing). The trucker may then be forced to store the container at a near-the-port storage facility to avoid costly detention charges. This is why the shipper's own WMS needs to be able to "talk to" and connect with the WMS of near-the-port storage facilities.

Figure 2: Examples of Warehouse Management System Vendors



<u>TMS</u>: Transportation Management Systems (TMSs) are a specialized software for planning, executing and optimizing the shipment of goods (**Figure 3**). Shippers, 3PLs and truckers/carriers are the main users of TMSs. TMSs primarily perform the task of finding and comparing the rates (prices) and services of carriers available to haul a customer's order, booking the shipment, and then tracking its movement to delivery.

Figure 3: Traditional Functions of a Standard Transportation Management System



ERPs output the order information the TMS needs to prepare and execute shipments. Besides the basics such as customer name and address, the data stream from ERPs also includes information to ensure that the right cargo is shipped at the right time. The TMS returns the shipment details that the ERP needs for its accounting and order management functions, such as the tracking number, carrier name, and costs. The shipment information generated by a TMS may also go to a customer relationship management (CRM) module so

the sales and customer service departments can update customers on order status.

Similar to a WMS, TMSs are available as standalone software or as modules within an ERP. The TMS market itself is deeply fragmented. There are some 1,000 odd TMSs in the North American market alone, and the number of carriers in a TMS can run in the thousands.[7] TMSs started as on-premises systems but more recently are deployed in the cloud, either hosted or as software-as-a-service (SaaS). Software that runs in the cloud has the advantage of easing connectivity between TMS (and WMS) users, carriers, customers and logistics partners, and also lends itself to more mobile and API networks.

Again, as **Figure 1** above illustrates, ideally the shipper, 3PL or trucking carrier's TMS is API connected to the enterprise systems of other service providers (chassis providers, terminals, ports, railroads, and ocean carriers). However, with the exception of several TMS providers who recently integrated with a small number of marine terminals at the Ports of Los Angeles and Long Beach, API integration has yet to occur at a meaningful level.

Finally, much of the recent growth in the TMS market comes from cloud offerings that companies buy to replace their on-premises, legacy TMS systems (**Figure 4**), a trend that is likely to continue. Though many providers prefer to run their TMS in the cloud because of the connectivity advantages and potential savings in IT labor and infrastructure, on-premises deployment is still preferred by some large BCOs, trucking carriers and 3PLs that have stringent security requirements and want day-to-day control of their software and proprietary information.

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[7] Eric Johnson, *ARO 2020: Digital freight brokers team up with established TSM firms*, JOURNAL OF COMMERCE (Dec. 27, 2019), https://www.joc.com/technology/transportation-management-systems-tms/aro-2020-digital-freight-brokers-team-established-tms-firms_20191227.html.

Figure 4: Examples of TMSs Used by Logistics Providers (partial list)

Vendor	Comments
TRINIUM Technologies WISETECH GLOBAL GROUP	Trinium has done some API opening/integration. It also has a mobile app for truck drivers, MC3. The app performs geofencing (automated dispatch event update, enabling more timely and accurate data for dispatchers and customers); electronic Proof of Delivery (POD) captures documents via camera (reduces admin costs and gets invoices out faster); GPS tracking for improved visibility and asset utilization; and intermodal dispatch workflow (pre-integrated with the TMS).
Compcare Services AN ENVASE COMPANY	In 2019 Compcare emerged as the first TMS to integrate with the Long Beach Container Terminal's APIs. The importance of this is that it replaced the need for dispatchers to manually key orders into terminal websites and enabled Compcare and LBCT's enterprise systems to "talk" to one another as trucks entered the port to pick up waiting containers. Since then, Compcare has expanded API integration into additional Southern California terminals: TracPac, TTI, WBCT, Yusen/YTI and ITS terminals.[1]
GTG TECHNOLOGY GROUP AN ENVASE COMPANY Profit Tools AN ENVASE COMPANY McLeod SOFTWARE PCS	

[1] TMS provider Envase recently acquired Profit Tools, GTG and Compcare. In 2020, it also acquired SecurSpace (a leading online marketplace that connects companies looking for storage to those with excess capacity). It appears that its strategy is to, through acquisition, create a single, massive state-of-the-art TMS company (the "Tesla" of TMS companies) – and one that relies heavily on OCR (optical character recognition) to efficiently scan and store information from the large number of documents and forms truckers deal with on a daily basis. Heavy API use and integration will be a part of this new, larger TMS company. *See* Chris Gillis, Envase Technologies multiplies intermodal TMS by three, *American Shipper* (June 7, 2020).

III. FRAGMENTATION AND EVOLUTION OF ENTERPRISE SYSTEM TECHNOLOGIES

There is a high level of fragmentation in the digital technology landscape, especially as it applies to logistics. Enterprise system users are not monolithic, they are at different stages of their technology adoption, sophistication and maturation. Some purchase and use the newest ERPs, WMSs or TMSs, others—not even close. Looking at the 40-year history of the development of the technologies that run these systems (**Figure 5**), we can better understand the depth of this fragmentation, and some of its causes.

Figure 5 illustrates that prior to the 1980s, logistics "technology" was driven by telephone, paper, fax, and mail. In the early 1980s, rudimentary personal computers arrived to help carry some of that workload. The '80s and early '90s then saw the arrival and domination of the client server model (on-premises enterprise systems). In the mid-1990s application service providers (ASP) enterprise systems arrived (ASPs are businesses that provides computer-based services to customers over a network).

Figure 5: The Evolution of the Logistics System and Its Fragmentation

Source: *The Gap Between Logistics and Technology* (April 28, 2021) JOURNAL OF COMMERCE webinar; Michael Johnson speaker (modified).

Fast forward to the mid-2000s, where in Figure 5 we observe the arrival of cloud-based technology. With cloud-based technology, data is centrally stored so companies can access relevant information simply by having an internet connection. This data can be accessed on all sorts of devices including laptops, desktops, smart phones and tablets. Data can also be easily connected from different sources, which can be used to gain further insights. Using the

cloud, data can be transmitted simply and quickly. As soon as the data is entered and synchronized it can be transferred and accessed immediately by all relevant parties.

Cloud-based technology continued to evolve so that by roughly 2010 lower development costs resulted in the proliferation of new "lightweight technology solutions" (SaaS 2.0) meant to solve specific supply chain problems. Lightweight software, also called lightweight program and lightweight applications-solutions, is a computer program that is designed to have a small memory footprint (RAM usage) and low CPU usage, and overall a low usage of system resources.

During the past decade (~2010 forward), Figure 5 further shows that the logistics industry has seen an explosion of new technologies and investment, to the point where some argue that the number of technology solutions is starting to become a part of the problem, because it further exacerbates technology dispersion and fragmentation.[8]

A. What's the Takeaway from This Ecosystem Evolution?

A number of small and medium-sized importers and exporters and their logistics providers purchased (or in some cases internally built) their ERPs, TMSs and WMS at different points in time. This means a number of them are using different underlying technologies, thereby resulting in "legacy systems" that are not API (or EDI) friendly. I.e., their enterprise systems do a poor job (or no job) of communicating with others and sharing data.

During the next decade the million-dollar question in the import and export logistics verticals will not be so much whether these disparate enterprise systems will upgrade and become more API or EDI connected, but how they connect and at what pace. Broadly speaking, logistics innovation is heavily

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[8] *See* Adam Robinson, *When logistics technology hurts more than it helps*, JOURNAL OF COMMERCE (May 28, 2020), https://www.joc.com/technology/when-logistics-technology-hurts-more-helps_20200528.html.

driven by the demands of the end-customer and the pressures faced by those customers. For example, high fashion apparel and athletic shoes entail fast product cycles and provide retailers (the logistics end-customer) with high margins. Those logistics chains are built and resourced to better address supply chain disruptions. On the other hand, BCOs, shippers and their logistics providers selling or moving BBQ tools, novelty gifts, or propane tanks operate under very different margins, logistics conditions and resources.

It should be no surprise to learn that, in general, the low margin logistics and value chains of many importers-exporters (certainly the small and medium-sized ones) more closely resemble the BBQ tool, novelty gifts, and propane tank category than the high fashion apparel and athletic shoe category. And as much as we would like to think that the latest "once in a lifetime" event—labor strikes, tariffs, COVID-19 and the subsequent skyrocketing consumer import demand it brought about—will herald industry wide changes in logistics, the fact remains that decades of legacy systems and software infrastructure still need to be dismantled. This dismantling will occur but again, it will take time and is unlikely to occur at an even pace across users and industries. Regardless of how this transformation occurs and the pace, it is the eventual harmonization of technology and the data the feeds into it that will help BCOs in all verticals to fully utilize new digital technologies and APIs to unlock additional value for their business.

IV. VISIBILITY DATA, NODES AND THE ENABLERS WHO PROVIDE THAT DATA

Figure 6 represents the stakeholders who collaborate (or don't collaborate) to supply important data to the logistics digital ecosystem to allow it to efficiently function. Below we briefly discuss each visibility provider (enabler) and some of the enterprise systems they may use.

Figure 6: **Visibility Data, Provider and Nodes**



A. BCOs and Shippers

Many large BCOs and shippers appear to have purchased commercially developed ERP, TMS, and in some cases WMS software and platforms. Small and medium-sized BCOs and shippers, on the other hand, seem to follow one of the following two paths:

- They purchased (local, on-premises server) ERP, TMS and/or WMS software long ago. It has since become dated and is now a "legacy system", presenting significant cost and time challenges for API integration with other stakeholder enterprise systems; or

- They previously built ("cobbled together") their own enterprise system not capable of API integration (or even EDI integration) with other systems. As an example, one such shipper shared that its system started off as an inventory system for prisoners, where each "cell" in the system is no longer used for prisoners, but now represents separate export transactions.

Again, the drawback of legacy and BIY (build-it-yourself) systems is the lack of integration capability (API or EDI) with other data sources and providers. This in turn usually results in the supplemental reliance on even "older-school" technologies (email, Excel spreadsheets, fax, overnight delivery) to "get the job done" in completing basic shipment, transportation and logistics tasks. While a shipper's legacy or BIY system may be "good enough" to process small orders and transactions (one or two containers), they do not work well at scale—where 10, 20 or 50 containers need to be managed and shipped on different dates to multiple locations.

B. 3PLs, Freight Forwarders and Trucking Companies

Each of these stakeholders have and utilize some form of an ERP and TMS. Again, depending on the size, history, culture and sophistication of the company, their enterprise system purchases may have occurred long ago from a commercial vendor (and is now a legacy system) or was a BIY build. For example, 95%+ of all trucking companies have less than 20 drivers[9] and such trucking firms understandably lack sufficient IT systems that allow for cloud-based API integration. Further, while some of the legacy systems of these

[9] *See* Paul Avery, *Maersk addresses detention & demurrage*, WORLD CARGO NEWS (April 22, 2021), https://www.worldcargonews.com/news/news/maersk-addresses-detention--demurrage-66169 and *American Trucking Association's Economics and Industry Data* (2021), https://www.trucking.org/economics-and-industry-data.

stakeholders may be fully or partially operated in the cloud and are capable of seamless updates and API integration with other systems, others are still housed and operated on local, on-premises servers.

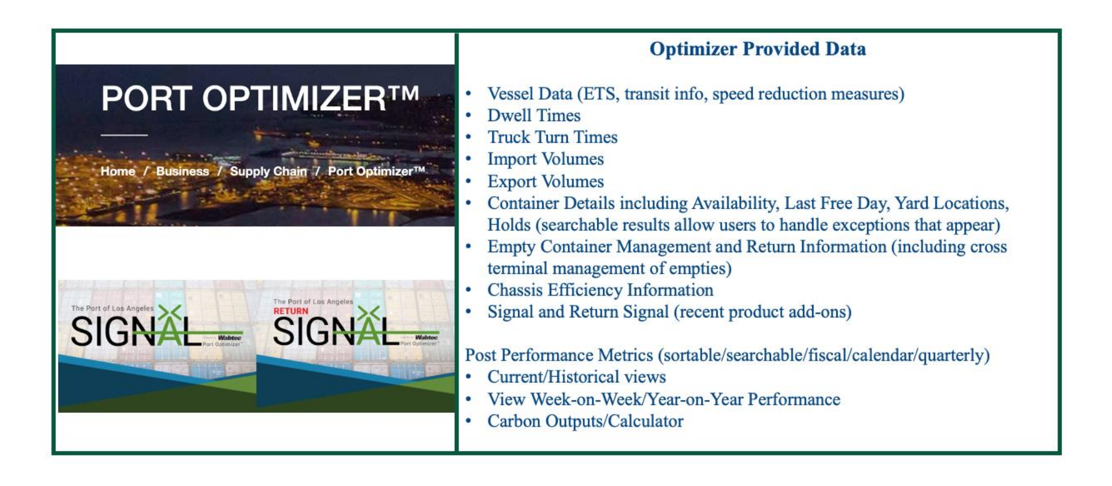
C. Ports and Terminals

Ports and terminals use a variety of technologies and systems to handle their various businesses and facility operations. Perhaps the most significant way they share their visibility data is through their community data portals.

Port Data Portals: As an example, the Port of Los Angeles offers its Wabtec-Port Optimizer,[10] Signal, and Return Signal to its terminals, BCOs, 3PLs, freight forwarders, truckers, chassis providers, railroads, and ocean carriers (**Figure 7**). The product's current focus is on port-wide visibility, not "end-to-end system wide visibility." Meaning, its focus is only on what is happening at the port, not the extended logistics chain starting from the BCO's inland processing/loading facility, to the port and into the terminal, onto the vessel, and then on to the foreign port, and vice versa. To date, the Port of LA has invested over $16 million in this project. All seven of the port's container terminals are users. In terms of its business model, Wabtec's "customer-client" is the port (paying-subscription based). The "users" (for free) of the portal are the other listed visibility enablers in Figure 7. The Optimizer's foundation rests on data sourced from data connects with nine of the top ten global shipping lines and all participating marine terminals. Additionally, the Optimizer contains data from other selected third-party providers, such as U.S. Customs and Border Protection, the Marine Exchange of Southern California, GeoStamp (trucker turn time data), and others.

[10] https://www.wabteccorp.com/digital-electronics/network-logistics/port-optimizer.

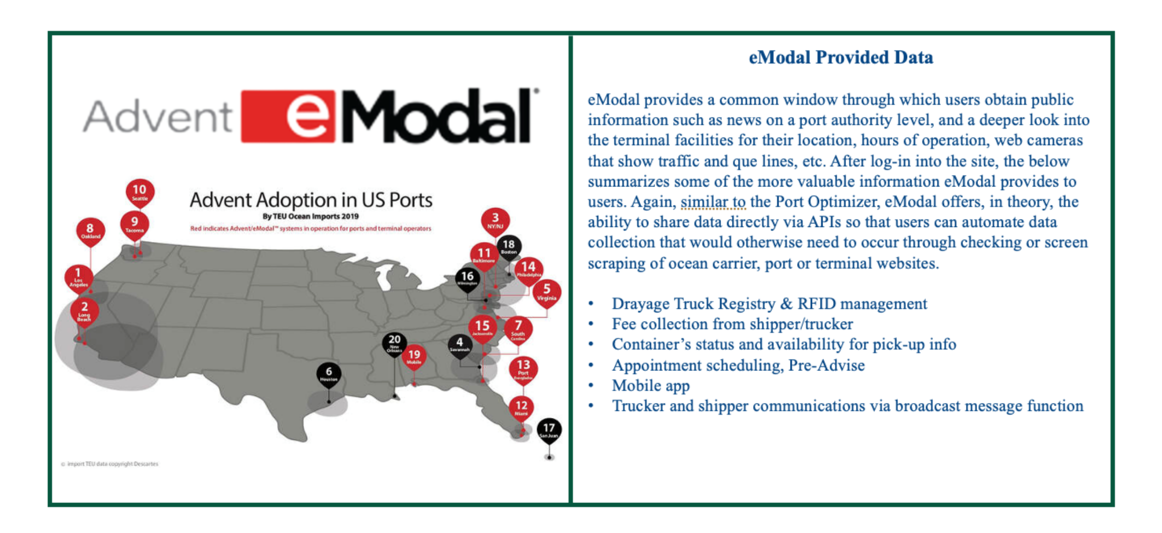
Figure 7: **Wabtec-Port Optimizer (Signal and Return Signal) Data Portal**



Terminal Data Portals: Three of the international marine container terminals (SSA Marine, Everport and TraPac) at the Port of Oakland use Advent eModal's (white-label) portal,[11] as do several terminals at the Port of Long Beach. As with the Port Optimizer, this product currently focuses on port-wide visibility, not system-wide visibility. Advent eModal is partially owned by SSA (one of the world's largest terminal operators). We note this fact because some terminal operators are concerned with adopting competitor products, which in turn impacts the degree of data sharing and dissemination. Despite this concern, eModal has been able to gain acceptance at other U.S. ports and their terminals (**Figure 8**). This success may be in part driven by the various ocean carriers alliances that exist. The eModal business model differs from the Wabtec-Optimizer in that its "clients/subscribing customers" are the terminals (not the ports) and the non-paying "users" of the platform are the BCOs, 3PLs, truckers, chassis providers, railroads, and ocean carriers.

[11] https://portofoakland.emodal.com.

Figure 8: Marine Terminal Adoption of Advent eModal Portal



<u>Examples of Stakeholder Utilization of Port and Terminal Data Portals</u>: BCOs shared that they use these portals to help gain visibility on whether vessels are arriving on time, the balance of the number of import and export vessels coming/going, container ERDs changes, and the payment of fees (particularly with eModal). Truckers also reported that the Optimizer provides them with information about where to return empty containers. The eModal portal (in Oakland) also helps them pay demurrage fees for some containers at the SSA Terminal. IEP chassis providers reported that portals can provide rough chassis data regarding the number of chassis needed the next day at various terminals, which in turn helps them manage nightly chassis re-balancing issues between the terminals.

<u>Criticisms of Port and Terminal Data Portals</u>: Logistics provider and user criticism includes concerns with sharing proprietary information with the portal and hence other portal users, these portals can only be as strong as their weakest data sharing link, portal data can be stale or incomplete, and portal outages can occur. Both the Optimizer and eModal are also viewed as geared heavily toward importers versus exporters. As an example, during the 2021

port congestion surge at the Ports of Los Angeles and Long Beach, truckers noted these portals can be helpful when pulling an import container out of the port (assuming the right chassis is available and a warehouse with available space exists to deliver it to) but these portals are not helpful in providing timely and accurate information for dropping off an empty or loaded export container. Further, several stakeholders described the actual data sharing and collaboration aspect of these portals as "less than 1/3 built out" in terms of where they need to be; meaning, the amount of data provided needs to be more robust and accurate. Finally, the artificial intelligence (AI) and predictive analytics claims attached to these portals ("with the large amounts of data generated the portal will be able to accurately forecast vessel arrival times, container and chassis availability, location, pick-up and drop-off …") remain more aspirational than actual working solutions. In short, more time and collaboration appear to be needed for these community portal systems to grow, develop, and mature.

D. Near-Port Warehouses and Storage Facilities (With Their ERPs and WMSs)

As an example, in the case of agricultural exports, "warehouses" normally include the processing facility or near-to-the-field cooperative warehouse used before the cargo is trucked to the port. But it can also include container storage yards or warehouses located near the port. This is because when the terminal is congested or the ocean carrier hauling the export container to the foreign port arrives late or cancels its arrival (blank sailing), the shipper may need to store its container at a nearby (and less costly) storage yard or warehouse facility (versus the more expensive on-terminal storage space) until the container can be loaded onto a vessel. And if the trucking company doesn't own or lease its own storage yard or warehouse near the port, it may have to utilize one of the below resources (**Figure 9**). Several BCOs and shippers shared with the authors that they are considering buying or leasing their own warehouses near the port, should congestion at the Ports of Los Angeles, Long Beach and Oakland remain a problem.

Figure 9: Near-Port Warehouses and Storage Facilities (Port of LA, LB, Oakland)

Name	Description
STE Shippers Transport Express	Shippers Transport Express is a 60-acre storage and transportation yard located in/near the San Pedro Port Complex
TOLL	Toll is a Port of LA owned 85-acre container yard and 600,000-square-foot warehouse located in nearby Wilmington. The site covers trucking and transload operations for approximately 9.5 million containers annually. Toll Global took this yard over after Cal Cartage lost its 50-year lease in 2019.
SecurSpace AN ENVASE COMPANY	SecureSpace offers parking and storage for commercial vehicles, overnight truck parking, trailer and container drop yards, and other needs. Locations available in Oakland, and Compton and Carson for the Ports of LA/Long Beach. In 2020 SecurSpace was acquired by Envase Technologies as part of its strategy to build a single, state-of-the-art TMS.
FLEET SERVICES	Fleet Services provides secure drop and storage yard for trucks and cargo. Locations in Oakland, as well as Montebello, Pico Rivera Ontario and South Gate that serve the Ports of LA/LB.

E. Chassis Provider ERPs

Figure 10 identifies the three main chassis providers and their ERPs. Chassis providers and the ocean carriers they work with obviously share data. For example, carriers provide updates to chassis providers on vessel arrivals and container discharge from the vessel; chassis providers in turn use this data to project equipment needs and availability. Data sharing also occurs between the chassis providers and marine terminals. However, with respect to the data chassis providers in turn push out to BCOs, shippers, 3PLs and truckers, that appears to mainly be limited to chassis availability (including broken chassis) and location (pick up and return). The sharing of this data also appears to occur mainly through EDI integration and website scraping (from chassis company

websites, marine terminal websites and in Southern California Pool or Pools website[12]). What stakeholders communicate is missing, particularly exporters and their truckers, is the lack of an API integrated ability to reserve the chassis at the same time truckers make their appointments to pick up the container at the terminal, and to also have the availability of that chassis be guaranteed (dedicated).[13]

Figure 10: **Chassis Providers (The Big 3) and Their ERPs**

Chassis Provider	Its Enterprise Resource Planning System (ERP) (Each supplemented by their own proprietary system)
DCLI	ORACLE
TRAC INTERMODAL	ORACLE
FLEXI VAN	ORACLE

[12] http://www.pop-lalb.com/.

[13] *See also* Cyrus Ramezani & Chris Carr, *Intermodal Chassis Availability for Containerized Agricultural Exports* (2021), USDA Funded Research Agreement No. 19-TMTSD-CA-0003, available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3810917.

F. U.S. Customs and Border Protection and USDA/State Inspection Enterprise Systems

Both U.S. Customs & Border Protection (CBP)[14] and USDA (e.g., Food Safety and Inspection Service)[15] utilize SAP for their ERP. However, it does not appear that either agency's ERP is API or EDI connected to the other stakeholder enterprise systems discussed in this report. With respect to CBP's Automated Commercial Environment (ACE) system and Automated Manifest System (AMS), through which the trade community reports imports and exports and the government determines such things as cargo admissibility, we were surprised to learn of a gap in communication and lack of data sharing between CBP and the ports. Specifically, all vessels seeking clearance to enter U.S. ports must file their manifests with CBP's AMS 24 hours before the vessel departs from the port of loading. This means if CBP took that data and alerted the ports, the ports would be receiving notice several weeks in advance. This system was established after 9/11 as a security measure to protect U.S. borders. While this lack of communication has not previously been a problem, the difference now is that maritime agents—parties who are responsible for arranging berth and required port and dray services—are now put in a position where they notify the ports just hours before the vessel's arrival, not weeks in advance, essentially forcing the hand of the ports to take them in when they can. And once these vessels arrive, their wait to unload can be significant. VesselFinder and MarineTraffic show that such unscheduled vessels can be anchored and waiting for an unloading berth for weeks, possibly more than a

[14] *See* Patrick Thibodeau, *United Nations looks to SAP for ERP system*, COMPUTER WORLD (January 16, 2009), https://www.computerworld.com/article/2530541/united-nations-looks-to-sap-for-erp-system.html and *SAP is the first enterprise software vendor to received U.S. Customs and Border Protection's ACE certification* (Jan. 11, 2016), https://news.sap.com/2016/01/sap-is-the-first-enterprise-software-vendor-to-receive-u-s-customs-and-border-protections-automated-commercial-environment-ace-certification/.

[15] USDA AGENCY FINANCIAL REPORT (2020) at page 80, https://www.usda.gov/sites/default/files/documents/usda-fy20-agency-financial-report.pdf.

month. The reason for the need for CBP to share and "push out" its manifest data is simple: doing so can help reduce port congestion.[16]

G. Ocean Carriers

Ocean carriers have sophisticated ERPs that share data with the ports and terminals they visit (and the chassis providers they work with). For example, departure and arrival data, container cut-off dates, ERDs, and detention and demurrage information. Some of this data is, in theory, EDI shared with terminals and ports for posting on their Port Optimizer and eModal portals, for the benefit of their users at Ports such as Los Angeles, Long Beach and Oakland. However, import and export stakeholders (and sometimes the terminals and ports themselves) note that when such data is shared by the ocean carriers and then disseminated through the system it is often stale, incomplete, or inaccurate. Or, they complain that it is not shared at all ("If the airlines can send us a text on our way to the airport letting us know that the flight will arrive 37 minutes late at Gate X instead of Gate Y, why can't the ocean carrier notify us that its vessel has left Yantian or that it will arrive in the Port of Long Beach in three days—why do the ocean carrier customer service reps tell us to go talk to the terminals for that information?").

Interestingly, Maersk continues with its acquisition strategy to acquire inland logistics and forwarding support as part of its strategy to vertically integrate, control and hence profit from the entire supply chain.[17] By gaining

[16] *See also* Lori Ann LaRocco, *Ports suffering from communication gap with US Customs*, FREIGHTWAVES (Nov. 8, 2021), https://www.freightwaves.com/news/ports-suffering-from-communications-gap-with-us-customs.

[17] *See, e.g.*, Eric Johnson, *Maersk's integrator push threatens forwarders differently*, JOURNAL OF COMMERCE (Nov. 2, 2020), https://www.joc.com/maritime-news/container-lines/maersk-line/maersk's-integrator-push-threatens-forwarders-differently_20201102.html, Eric Johnson, *Maersk's 4PL play could further rile forwarder partners*, JOURNAL OF COMMERCE (Apr. 9, 2021), https://www.joc.com/node/3673591 and Greg Knowler, *Maersk signals next logistics acquisition will be billion dollar deal*, JOURNAL OF COMMERCE (May 11, 2021), https://www.joc.com/maritime-news/maersk-signals-next-logistics-acquisition-will-be-billion-dollar-deal_20210511.html.

end-to-end control of the supply chain and its equipment assets, data and information, an ocean carrier is, in theory, able to cut out the middlemen (i.e., 3PLs and freight forwarders—particularly the ones small and medium-sized importers and exporters rely upon), better integrate supply chain technology nodes, and thereby provide a range of add-on and real-time visibility services to BCOs and shippers. However, while the large importers and exporters may be aware of this development and are able to use it to their advantage, we found that small and medium-sized importers and exporters are generally unaware of this shift and the risk it may present to them and their business model.

H. Railroads

We were unable to identify the ERPs utilized by major railroad companies connecting to the Ports of LA, Long Beach and Oakland. However, whatever their ERP systems may be, based on our discussions with various logistics stakeholders, it appears that railroads are surprisingly not API or EDI connected to the ocean carriers. Currently, there is data sharing between the ocean carriers and the marine terminal operators, but not necessarily for the benefit of the railroads. This suggests there is an opportunity for more data to be exchanged between vessel operators and the railroads, most likely through marine terminal operating systems (TOSs), which already need to "understand" what is being offloaded from the vessel and what is being loaded onto trains. TOS connectivity between ocean carriers and railroads could provide the common interface for all landside transport modes. Key information usually flows with the containers. For example, for containers arriving on a vessel, terminals will receive container information (weight, custom, hazardous, etc.) from the ocean carrier and as the boxes are loaded and departed on a train, the container detail is shared from the terminal to the railroad. From a planning and data visibility perspective, container-oriented information should be made available to the railroad as early in the process as possible.

I. Gap Filling Specialty Apps, Software and Websites

Notwithstanding the enterprise systems discussed above in subsections A-H, significant gaps remain due to the existence of legacy systems, lack of

API integration, and/or missing or incomplete EDI integration. These gaps impact the ability of importers and exporters to access data that can help them efficiently move their containers. Entrepreneurial BCOs and shippers therefore resort to a multitude of gap-filling specialty applications, software, websites, and other solutions to help them address logistics pain points.

As an example, **Figure 11** highlights BlueCargo, a startup that recently emerged from Y-Combinator (YC is a premier start-up incubator based in Silicon Valley). As of the date of this writing BlueCargo is focused just on the Ports of Los Angeles and Long Beach. Its website claims it dispatches 29% of LA/LB freight. A number of truckers and drayage firms rely on this subscription-based startup to help them determine where to return empty containers, schedule terminal appointments, and archive terminal screen shots so they can later access the proof they need to dispute detention fees. **Figure 12** highlights another specialty application truckers find helpful—VesselFinder[18] (or its competitor, MarineTraffic[19])—used to gauge ocean carrier arrival, vessels drifting or anchored outside of port, and vessel congestion.

[18] https://www.vesselfinder.com.

[19] https://www.marinetraffic.com.

Figure 11: BlueCargo.io

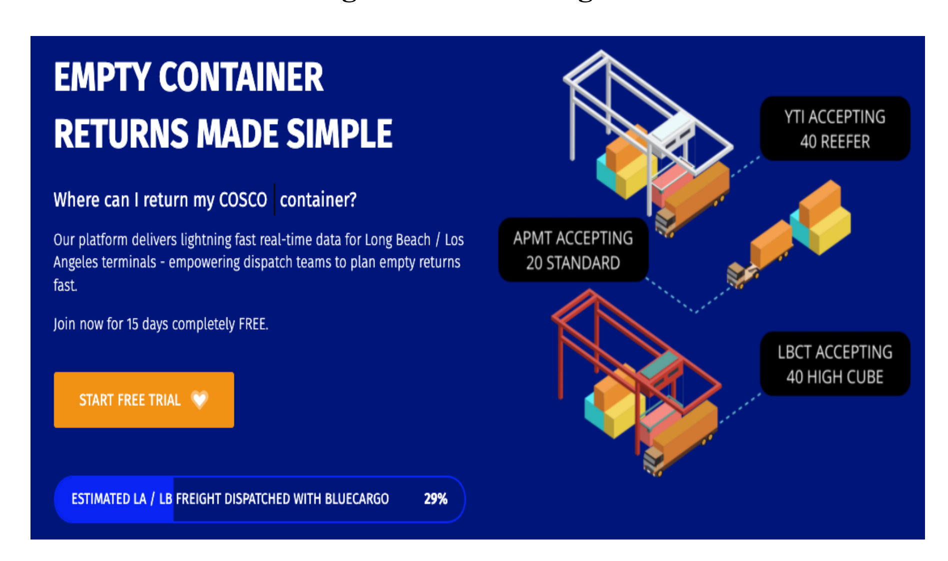
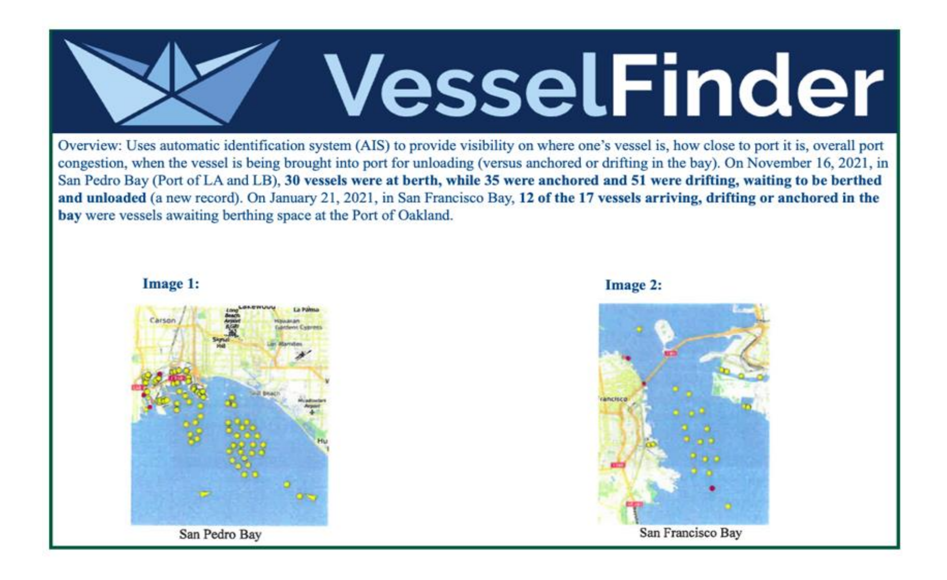


Figure 12: VesselFinder.com



Again, however, such "technology gap fillers" are both a blessing and curse. While they provide more data and in doing so help mitigate certain logistics challenges, they also further add to fragmentation (i.e., yet one more app to have to scroll through on a desktop or phone). The more we increase the number of solutions that address a logistics problem, the more we need API integration to achieve system collaboration and visibility. For a multitude of other specialty app examples we refer the reader to our recently published U.S.D.A. research and report.[20]

V. MITIGATING THE TECHNOLOGY-LOGISTICS-FREIGHT FRAGMENTATION AND DISCONNECT

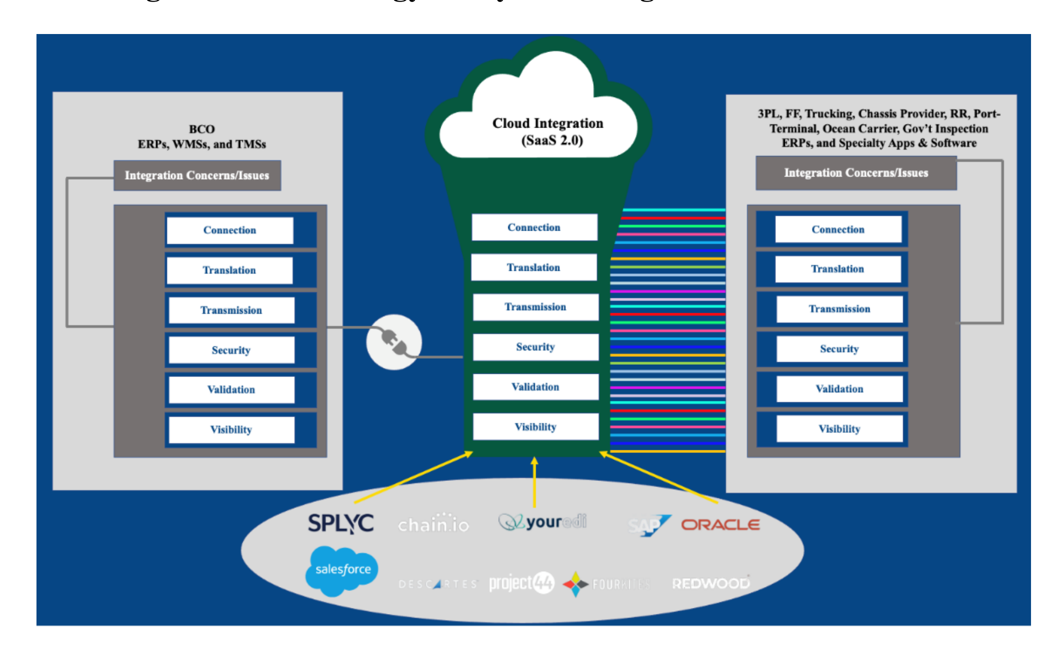
Figure 13 addresses how a fragmented technology-logistics-freight ecosystem evolves to achieve greater data connectivity and collaboration. This model envisions a "single platform" that brings digital technologies and enterprise software systems together. If adopted across all logistics nodes, this allows technology teams on all sides to reorient their integration strategies so that the system as a whole works faster and at a lower cost.

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[20] *See* Chris Carr & Cyrus Ramezani, *The Impact of New Digital Technologies on U.S. Containerized Agricultural Exports - Focusing on the Ports of Los Angeles, Long Beach, Oakland* (2022), USDA FUNDED RESEARCH AGREEMENT NO. 20-TMTSD-CA-00-7, available at https://www.cob.calpoly.edu/wp-content/uploads/2022/01/Carr-and-Ramezani-USDA-Technology-Report-1.3.2022.pdf. Appendix A to that report is a partial inventory of some of the specialty apps, software and websites used in the agricultural export space. While that Appendix A is agricultural export focused, it is nonetheless helpful to study.

Startups such Splyc (now Splice),[21] Chain.io,[22] Youredi,[23] Redwood,[24] Project 44,[25] Four Kites,[26] and Descartes MacroPoint[27] are beginning to partner with BCO and shipper enterprise system providers (on the left) and 3PLs, freight forwarders, trucking companies, and ocean carriers (on the right), in order to connect them in a way that supports the broader ecosystem.

Figure 13: Technology Ecosystem Integration and Connection



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[21] https://www.splyc.io / https://www.splice-it.com/.

[22] https://chain.io.

[23] https://www.youredi.com.

[24] https://www.redwoodlogistics.com.

[25] https://www.project44.com.

[26] https://www.fourkites.com.

[27] https://www.macropoint.com.

The strategy of these technology startups has been to build their platforms by attracting shippers and customers, and then pulling in those shipper and customer networks or carriers. In so doing, they seek to build the holy-grail "single platform" or "single logistics button" for shippers to use. However, to complete this model as it applies to logistics providers, chassis providers, ports, terminals, banks, insurance companies, railroads, government agencies and their enterprise systems (as well as the specialty apps discussed above) will also need to be included and connected with BCOs and shippers.

Will this model continue to be built out and evolve in a way that fully includes and addresses the needs of small sized importers and exporters and their logistics providers? Only time will tell. In the meantime, it's important for these stakeholders to understand, monitor and where possible participate in its evolution.

We now turn to a discussion of APIs and their import to the logistics ecosystem.

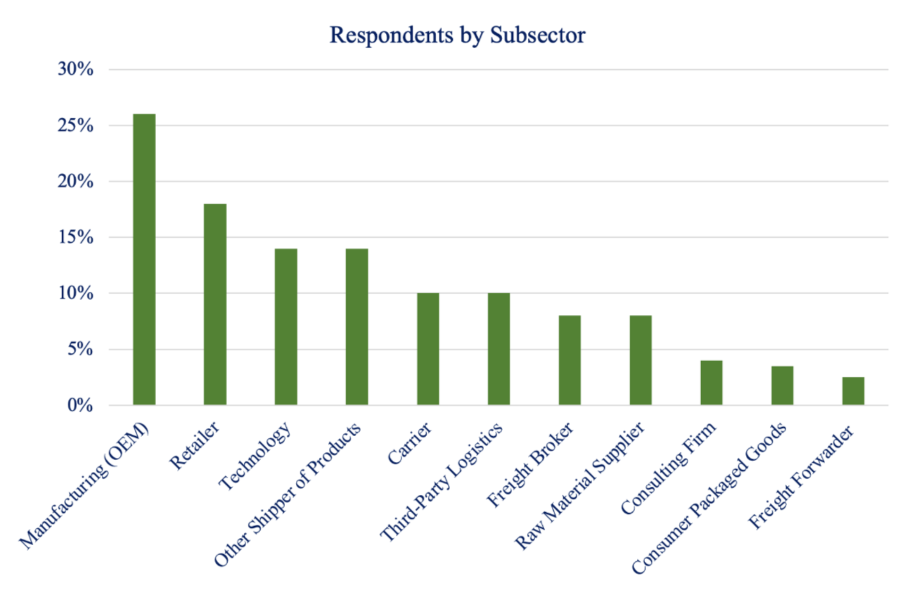
VI. WHAT'S AN API?

An API (application program interface) is a software-to-software interface. APIs provide a secure and standardized way for software applications to connect and work with each other. They deliver the information or functionality requested, without user intervention, and in a less rigid fashion than Electronic Data Interchange (EDI)—the most common logistics system-to-system standard.[28] Think of API's simply as a mechanism for the exchange

[28] In terms of EDI usage, one recent survey of 120 freight forwarders across 50 countries noted 85 percent of supply chain transmissions still rely on EDI format. *See* Eric Johnson, *Data, culture drags down forwarding API usage: survey*, JOURNAL OF COMMERCE (Nov. 9, 2021), https://www.joc.com/technology/logistics-technology-providers/data-culture-drags-down-forwarding-api-usage-survey_20211109.html; Eric Johnson, *Is logistics finally ready for APIs?*, JOURNAL OF COMMERCE (Mar. 12, 2019), https://www.joc.com/technology/logistics-finally-ready-apis_20190312.html ;and *The Future of APIs: How APIs Are Changing Transportation and Procurement Strategies*, FREIGHTWAVES-REDWOOD WEBINAR (May 13, 2021).

of information in the broader technology environment. While EDIs offer a universally standard experience, APIs can be designed to support each user's individual needs. This good news for end-users and third-party API developers, and since APIs do all the heavy lifting in the background, end-user digital experiences remain seamless and effortless.[29] The data provided in **Figures 14, 15, 16** and **17** below collectively illustrate that shippers and their logistics providers remain in the early stages of API use and sophistication.[30]

Figure 14: Shippers and Their Logistics Providers Surveyed

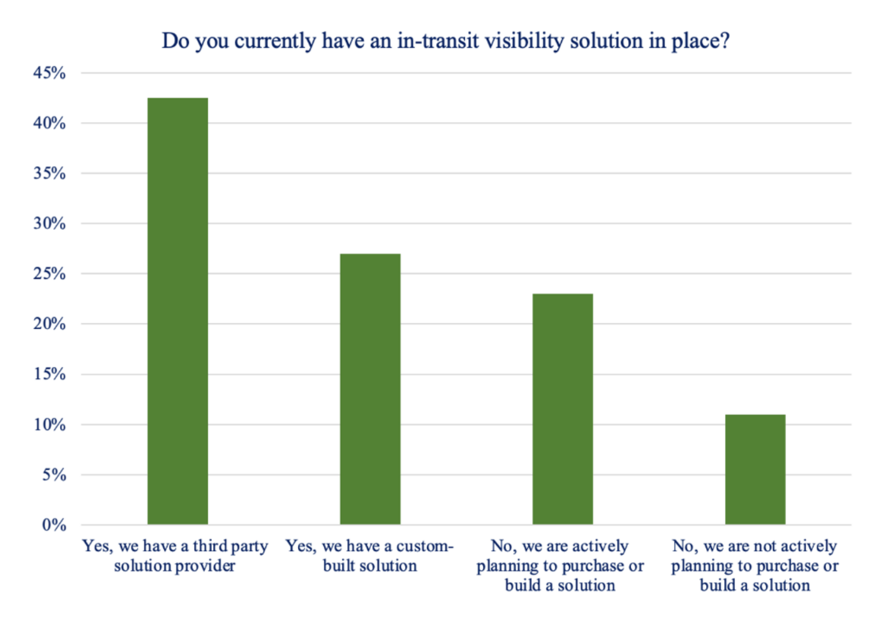


Source: FreightWaves-Endava, *White Paper: From Factory to Front Porch* (Aug. 20, 2021), https://www.freightwaves.com/news/white-paper-from-factory-to-front-porch.

[29] A picture can be worth a thousand words. For visual examples that help move the understanding of APIs from the abstract to the concrete, see this video tutorial and visual: David Berlind, *What is an API and Why does the API Contract Matter so Much?*, PROGRAMMABLEWEB (Jan. 24, 2020), https://www.programmableweb.com/news/what-api-and-why-does-api-contract-matter-so-much/analysis/2020/01/24.

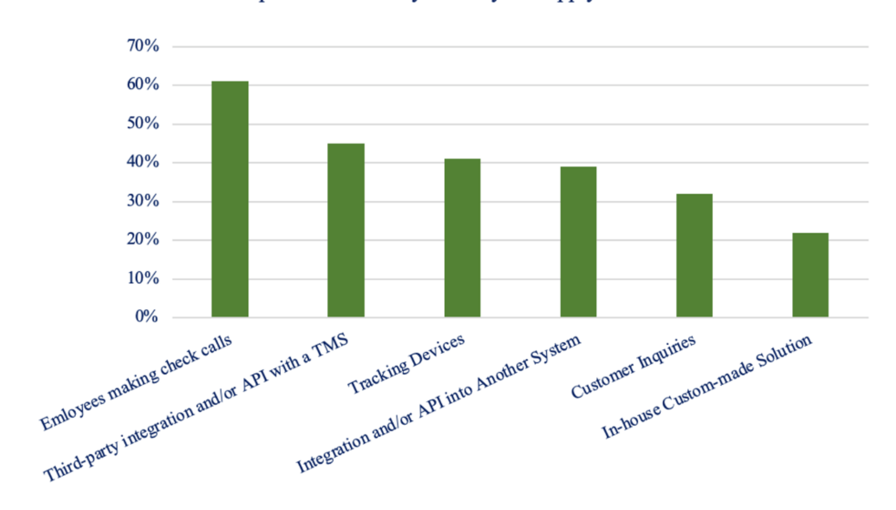
[30] *See also* Eric Johnson, *Is logistics finally ready for APIs?*, JOURNAL OF COMMERCE (Mar. 12, 2019), https://www.joc.com/technology/logistics-finally-ready-apis_20190312.html.

Figure 15: Do You Have a Cargo Visibility Solution in Place?



Source: FreightWaves-Endava, *White Paper: From Factory to Front Porch* (Aug. 20, 2021), https://www.freightwaves.com/news/white-paper-from-factory-to-front-porch.

Figure 16: How Do You Currently Track and Trace to Gain Cargo Visibility?



Source: FreightWaves-Endava, *White Paper: From Factory to Front Porch* (Aug. 20, 2021), https://www.freightwaves.com/news/white-paper-from-factory-to-front-porch.

Figure 17: Level of Current API Integration With Outside Data Providers



Source: FreightWaves-Endava, *White Paper: From Factory to Front Porch* (Aug. 20, 2021), https://www.freightwaves.com/news/white-paper-from-factory-to-front-porch.

Per our interactions with small and medium-sized importers and exporters and their logistics providers, constraints on their ability to upgrade and replace legacy and BIY systems with API, cloud based solutions include (paraphrased):

- Priority ("we have more pressing problems to deal with than this").
- Lack of training and education re: the value of APIs ("where do we start?").
- Security and proprietary concerns ("who can access our data?").
- Privacy concerns ("will API usage broadcast who our customers are?").
- Cost ("our margins are already tight so how can we begin to do this?").
- Lack of understanding in how to analyze, interpret or use the large volumes of data that APIs can generate and highlight ("we are already swimming in data").

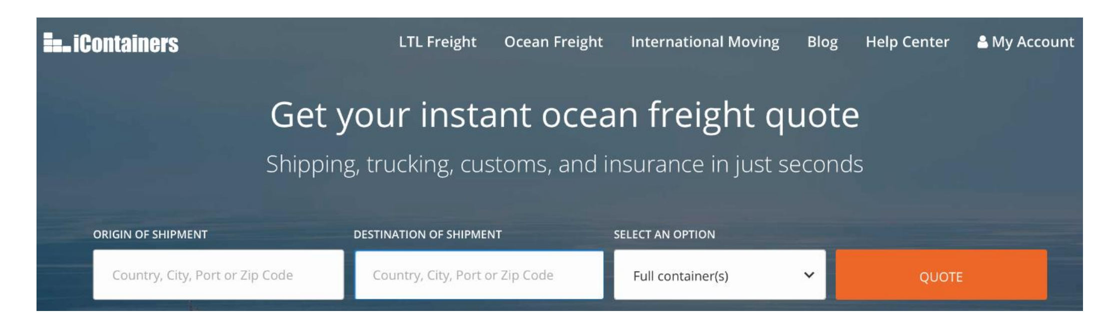
- API integration requires resources and energy to convert or delete established EDI connections or migrate away from the use of (even) older technologies ("so much to do, so little time").
- The belief that older technologies such as email, fax, personal computer or work desktop, telephone and mobile phone are "good enough."
- Organizational culture and/or ability of staff and employees to keep up with changes in technology ("our people are already burned out").
- Lack of compatibility between the stakeholder's legacy system and today's SaaS 2.0 digital technologies (as previously mentioned, 95%+ of all trucking companies have less than 20 drivers and often times lack sufficient IT systems that allow for cloud-based API integration).
- Finally, a number of today's startups in the logistics space are far ahead of their customers. What we mean by this is that they are built on SaaS 2.0 cloud-based technologies, as opposed to EDIs or the "old" server-on-the-premise legacy model and system. These startups are also venture capital backed, with immense investor pressure to scale. Scale means building a product that is good enough for everybody, but not perfect for somebody. This in turn means that their incentives are focused on selling customers their software pretty much as-is, not to work with each customer to try and integrate the customer's legacy system and data into a newer cloud-based system and product.

Starting in roughly 2015, shippers started to realize they were reliant on one another and needed to see each other's data. At a minimum, shippers should be able to see data on a single platform (not have to check, screen shot or scrape multiple websites) about their own cargo, including what and where containers and chassis are available, as well as available terminal container pick-up and drop-off locations and appointments. And if shippers wish to reap the benefits of machine learning and artificial-predictive intelligence, which can only operate and learn from large amounts of data, they have no choice but to pursue a strategy of API integration with their service providers and logistics partners. The digital technology ecosystem only efficiently works if stakeholders in the logistics chain are connected through APIs and they share the data needed to implement real and smart process automation.

A. An API Example

Assume you are a medium-sized company located in the California Central Valley and you sell a variety of nuts. You export most of your product out of the Port of Oakland, and when needed LA/Long Beach. A Chinese buyer submits a late order for five dry containers of pistachios. To get the containers to the buyer on time, you determine you will need to utilize the container spot market to obtain space on an ocean carrier bound for the Port of Shanghai. Your first step might be to search the website of iContainers[31]—a startup operating in this space. iContainers offers a web platform where importers-exporters can receive and compare container shipping rates in real time. Think of iContainers as Fandango, only it is for TEU/container transport instead of trying to find the latest box-office hit near you (**Figure 18**).

Figure 18: iContainers.com

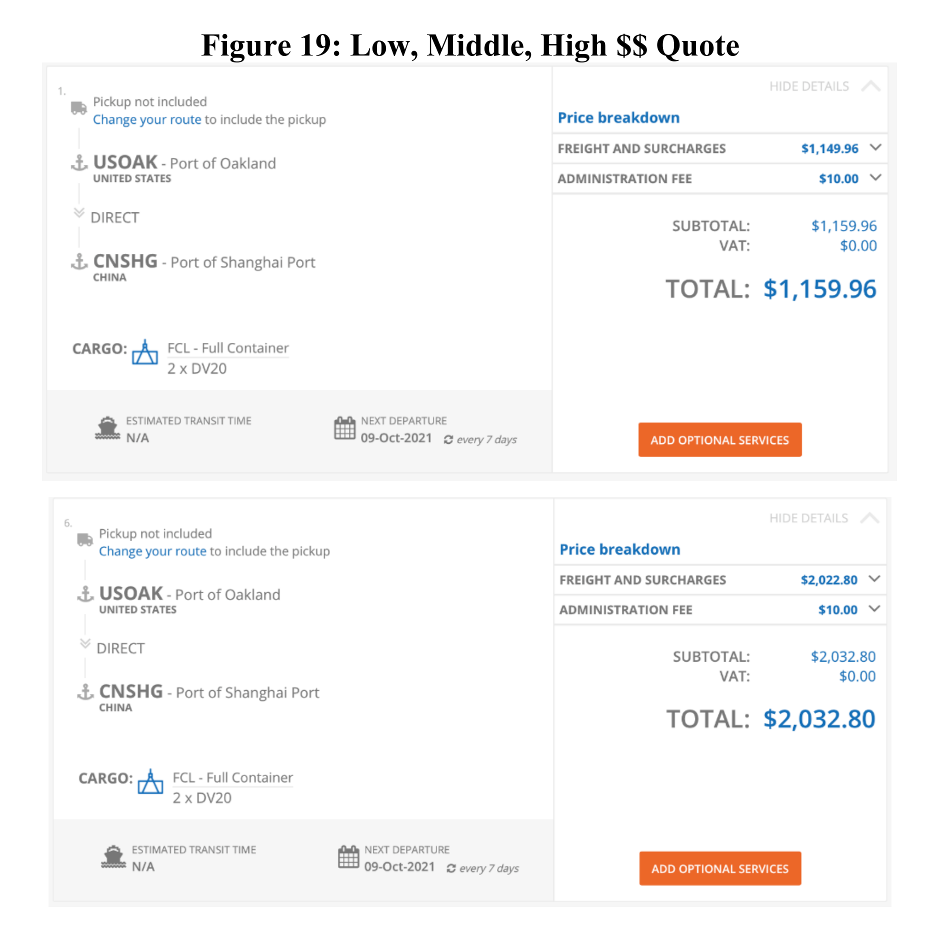


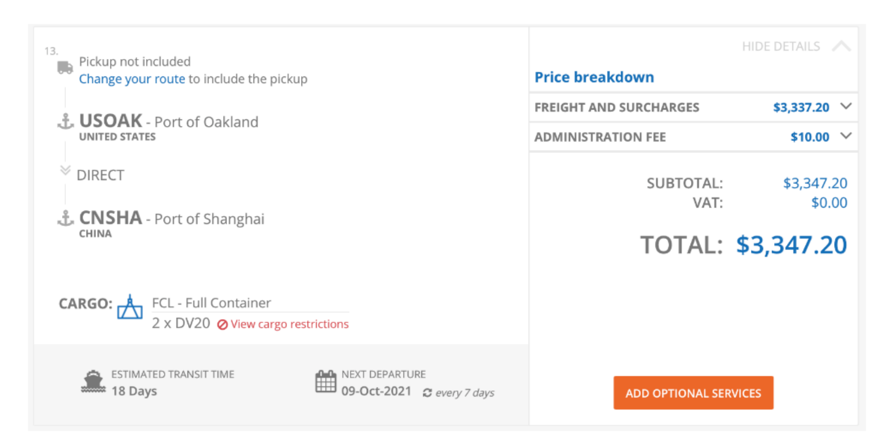
After typing into the iContainers website the port of origin (Port of Oakland), destination (Port of Shanghai), cargo (20-foot TEU) and shipping date, you find a dozen quotes. Below is what you see for the lowest, middle, and highest price quote (**Figure 19**). Although you are on iContainers' site the whole time, there are multiple API applications at work to make your search possible. When you click "search" the site uses APIs to request access to ocean carrier (and other) databases. This is called an *API call* (discussed below).

[31] https://www.icontainers.com.

Those APIs retrieve the requested information so that the iContainer site can display the relevant results for you.

Figure 19: Low, Middle, High $$ Quote





As expectations for such seamless user experiences grow, more and more companies are looking to APIs to deliver more value to consumers for less money and in less time. By leveraging APIs to access another company's data, software, services, or other, companies are able to extend the functionality of their own products while saving time and money.

B. What Can APIs Be Used For?

Pretty much everything. Want to embed Instagram photos on your import or export website? There is an API for that.[32] Want to add hotel or Airbnb listings to your import-export website to make it easier for your foreign customers or partners to find a nearby place to stay when they visit you? There is an API for that.[33] And for the maverick import-export entrepreneur looking to spice up their website to build a modern brand that is fun with a "cosmic" look and feel (versus just "global"), believe it or not there is even a Yoda-

[32] *See Introducing Web Embedding Instagram Content on Websites* (July 10, 2013), https://about.instagram.com/blog/announcements/introducing-web-embedding-instagram-content-on-websites and Iain, *How to Embed An Instagram Feed Into Any Website* (August 9, 2020), https://intagrate.io/2020/08/how-to-embed-an-instagram-feed-into-any-website/.

[33] *See Hotelbeds API Suite for Hotels, Activities and Transfer*, https://developer.hotelbeds.com and Elfsight, *How to get and use Airbnb API: partnership and integration*, https://elfsight.com/blog/2020/11/how-to-get-and-use-airbnb-api-partnership-and-integration/.

themed (from *Star Wars*) translator API for that.[34] Common business use applications for APIs include:

- **External Data Sharing**: Any time a program needs to get data from a third party, that data can be shared through an API. This is the iContainer example above. Another example is e-commerce sites that harvest your payment information from a payment processor.
- **Embedded Content**: This is the Instagram example above, where one embeds a piece of content that is not hosted by the same company as the website itself. A second example is embedding YouTube videos in your platform, where an API request is made to the owner of the embedded content/video to retrieve it.
- **App Integrations**: When two digital applications work in conjunction, e.g., DropBox and Gmail, Zoom and Gmail, Grammarly and Gmail—it's likely that an API is involved.
- **Internal Sharing**: APIs are not just for sharing data externally. Many companies have internal API programs that help them become more efficient in aspects of their product development, HR and customer service. For example, both *USA Today* and *The Guardian* have internal APIs that help them speed up and improve content development.[35]

[34] *Yoda Translator API*, https://funtranslations.com/api/yoda.

[35] *See* RestCase Blog, *Internal and External APIs* (Mar. 25, 2017), https://blog.restcase.com/internal-vs-external-apis/#:~:text=Both%20The%20Guardian%20and%20USA,API%20traffic%20is%2099%3A1; Sakib Supple, *Structured content: benefits for creating and publishing articles*, THE GUARDIAN (May 9, 2019), https://www.theguardian.com/info/2019/may/10/structured-content-benefits-for-creating-and-publishing-articles and RapidAPI, https://rapidapi.com/auth/sign-up?referral=/mikilior1/api/Guardian. Note that *The Guardian's* internal API traffic is roughly 6-7 times that of its external traffic.

C. How Do APIs Actually Work?[36]

Again, APIs are simply a set of definitions and protocols that allow software and its components to talk to each other, interact with each other, and share data, using a set of commands. APIs deliver one software application's request to another application, and receive a real time response. If an API data producer's application and its server providing the resource can do what the API data consumer's requesting application asked, the API brings back the desired information. If the producer's application and its server can't do what the consumer asked, e.g., the consumer requested information or a resource it did not pay for or has permission to access, then the API will return with an error message. Thus, controlling access to servers in this manner is important. Rather than give away all of a program's information or code, an API provides requesting consumers only with data that has been made available to them, rather than all of a program's information.

An *API call* is how an API consumer submits its request to the producer API's server. API calls also consist of everything occurring after the request is submitted, including when the API retrieves information from the server and delivers it back to the API consumer. The most common and basic API calls to send to a server are:

- GET: To retrieve a resource
- POST: To create a new resource
- PUT: To edit or update an existing resource
- DELETE: To delete a resource

Example: Ordering food at a restaurant. The diner represents the client. The waiter represents the API. The chef represents the server. The client looks over the menu, picks the meal they want, and places their order with the waiter. The waiter brings the client's request to the chef. The chef

[36] The discussion in Subsections VI. C-E is informed by Anna Fitzgerald's *The Ultimate Guide to Accessing & Using APIs*, HUBSPOT (originally published October 2019 and updated since), https://blog.hubspot.com/website/application-programming-interface-api.

executes on the order Then, the waiter brings the client their meal and they enjoy it all the more for not having had to make it themselves. But assume too many guests show up at the restaurant and there's not enough space to accommodate them. Further assume this keeps happening as the restaurant grows in popularity. What does the restaurant do? This is where API keys come in.

D. What is an API Key?

An *API key* is a unique identifier used to authenticate API calls. The key is made up of a string of letters and numbers that identify the client. The key grants or denies the API call-request based on the client's access permissions, and it helps track requests for usage and billing purposes. By using API keys, companies control the number of calls made to their APIs and ensure that only approved clients (API consumers) can access its server's resources.

Returning to the food ordering example, think of the API as an exclusive restaurant, where the customer must have a reservation (the API key) to eat at the restaurant. The restaurant does this (in part) to keep the number of customers within capacity so that the kitchen and chef can adequately and efficiently serve every customer. Similarly, by allowing only clients with an API key to access and use a firm's resources made available via the API, the firm helps ensure its software is used safely and can handle the number of requests coming in.

E. Types of APIs

Private/Internal APIs: These APIs are only made available to a company's workforce, to help it increase transparency, collaboration, productivity, efficiency, or other. In other words, internal stakeholders use these APIs as needed but customers and third-party developers cannot. These APIs are usually hidden from the public.

Partner APIs: These APIs are shared externally but only with those who have a business relationship with the company providing the API. Here, the thinking is, "If you scratch my back, I'll scratch yours." Waze,[37] the traffic app utilized by thousands of truckers via their mobile phones as they haul freight is a good example. Waze uses APIs to exchange data with cities and other partners about road closures, accidents, construction delays, and working vehicles, such as snowplows. Many businesses favor Partner APIs over Open APIs (discussed below) because they want greater control over who, how and when others can access their data. Some businesses even require partners to submit a request detailing how they wish to use the API and what the underlying data would grant them before granting access.

Open APIs: These APIs are available for external consumption and are understandably more restricted in the data, information or assets they share than Private or Partner APIs. While some Open APIs are free, others charge a subscription fee to use, which is often tiered based on usage. The primary advantage to a company in making its APIs public is that by sharing its APIs with others it can learn more about support, documentation, and authentication schemes to help improve the adoption of its APIs. It may also encourage third parties to create apps, add-ons, or integrations with the APIs to not only help make their products or services more valuable but also make the APIs themselves more valuable.

Composite APIs: These APIs allow consumers to bundle API calls so that they receive one unified response from different servers. For example, assume an importer or exporter wants to install a shopping cart on its website (or mobile app). This will require the use of a shopping cart API. One might think that this will require just one API request, but in fact there are several requests that need to be made. One will need to create a customer profile. Another will need to create the ability to order, add an item, add another, and change the status of the order. Instead of making five separate API calls in

[37] https://developers.google.com/waze/.

succession, the importer/exporter will use a Composite API so that just one call is made.[38]

F. API Benefits

Why pay for resources one can create on their own? Why share data, information and resources with competitors? Why put in the time, effort and money of developing and rolling out an API just so only one's own workforce can use it?

1. Data Consumer Benefits

Before a company develops and implements its own APIs within the company, it may make more sense to use another firm's API. Or, a company may decide to develop and use its own APIs to automate certain tasks. Either way, the company is an API consumer. API benefits to consumers include:

Productivity: Many companies consume their own APIs. They do so because using APIs internally empower its workforce to streamline, collaborate and improve transparency across the organization. Amazon CEO Jeff Bezos understood this, as evidenced by the below "API Mandate" internal memo he is said to have issued in 2002, well before most people had even given any thought to APIs or their utilization:

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[38] CEPTES, *Composite API: Bunch Multiple Calls Within a Single API Request* (Aug. 11, 2021), https://www.ceptes.com/composite-api-bunch-multiple-calls-within-a-single-api-request/.

Figure 20: Bezos API Mandate Memo[39]

1. All teams will henceforth expose their data and functionality through service interfaces.
2. Teams must communicate with each other through these interfaces.
3. There will be no other form of interprocess communication allowed: no direct linking, no direct reads of another team's data store, no shared-memory model, no back-doors whatsoever. The only communication allowed is via service interface calls over the network.
4. It doesn't matter what technology they use. HTTP, Corba, Pubsub, custom protocols — doesn't matter.
5. All service interfaces, without exception, must be designed from the ground up to be externalizable. That is to say, the team must plan and design to be able to expose the interface to developers in the outside world. No exceptions.
6. Anyone who doesn't do this will be fired.
7. Thank you; have a nice day!

Note how this document reads more like a manifesto written by an engineer than an MBA. It says nothing about business goals, strategy, revenue, cost cutting, market share, supply chain, products, customers, HR, or firm culture. The usual "business speak" is missing. Yet today, even non-technologists can appreciate that this piece of writing may have been one of the more important pieces of communication in the history of business.

[39] Chris Liang, *The Memo* (June 20, 2021), https://chrislaing.net/blog/the-memo/?curator=MediaREDEF#site-nav and Nordic APIs, *The Bezos API Mandate: Amazon's Manifesto for Externalization* (Jan. 19, 2021), https://nordicapis.com/the-bezos-api-mandate-amazons-manifesto-for-externalization/.

And there are several takeaways. First, admittedly, Amazon is not an apples-to-apples comparison to importers, exporters, and their logistics providers. Bezos was addressing technology fragmentation, dispersion, and efficiency within only his own company, a far easier task than taking on the technology fragmentation of an entire industry such as import and export. Nevertheless, the example highlights the power and value of interoperability, transparency, and data sharing via API integration. Shippers in the import-export vertical have much to learn from this memo and example. Second, technology is more important to the success and efficiency of import-export than many people realize. Recognizing the potential of technology requires that such shippers update, upgrade, and transform their core operations and enterprise systems in order to realize the full benefits of today's cloud-based technologies.

User Satisfaction: Most companies, including small and medium-sized importers and exporters, want to provide the best product or experience they can for their customers. But rarely can they anticipate and satisfy every need and expectation. That is one reason for them to use APIs to extend the functionality of their products and services.

Innovation: By allowing developers to reuse and cannibalize software and pieces of code—whether third-party developers or internal members of the company—APIs empower firms to focus on developing new solutions rather than repeat work that's already been completed. For example, without the Google Maps API, developers of Transportation Management Software startups would have to dedicate their time and resources to drawing their own map and providing real-time map data to include this feature on their site for the benefit of truckers who use their software. Further, no matter how much time they put in, it would be nearly impossible for them to make it as detailed or reliable as Google's existing solution. Instead of wasting their time trying to reinvent the wheel, APIs enable developers to focus on creating new tools and functionality that deliver more value to their users.

2. *Data Provider Benefits*

Why create and share APIs with partners or the general public? In short, it presents business opportunities above and beyond those of simply consuming APIs.

Revenue: A number of companies make their APIs public (OpenAPIs) and monetize them into additional revenue streams. Google,[40] LinkedIn,[41] Facebook,[42] and TikTok,[43]https://www.yelp.com/developers are obvious use cases. In fact, according to a recent MuleSoft-Deloitte Digital report, 35 percent of today's technology leaders generate more than a quarter of their organizations' revenue as a direct result of APIs.[44]

Scale: By sharing assets with a broad audience, a network of users beyond employees and non-paying customers may become dependent on one's API and the data and functionality it provides. I.e., third-party developers and paying consumers start to use and adopt your main platform. Your customer base is expanded and APIs help you generate new market opportunities, and even more innovation occurs through this give-and-take process between API consumers and API providers. Amazon Web Services (AWS)[45] is an excellent example. The AWS platform, which essentially allows any company or developer to run its applications on top of Amazon's technology infrastructure platform via APIs, is used by millions of customers around the world. This

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40 Google Product Index, https://developers.google.com/products/.

41 LinkedIn Developer Products, https://developer.linkedin.com/.

42 Facebook for Developers, https://developers.facebook.com.

43 TikTok for Developers, https://developers.tiktok.com/?refer=tiktok_web.

44 *See* Ross Mason, *The API Economy: It's Game Time*, WALL STREET JOURNAL (Jan. 9, 2019), https://deloitte.wsj.com/articles/the-api-economy-its-game-time-01547085728 and Mulesoft-Deloitte Digital, *Connectivity Benchmark Report* (2021), https://www.mulesoft.com/lp/reports/connectivity-benchmark-2021.

45 About AWS, https://aws.amazon.com/about-aws/.

helped transform Amazon from an online bookstore to the global transportation, logistics and supply chain giant it is today.[46]

VII. MANAGING LEGAL RISK THROUGH TERMS OF SERVICE AND API LICENSING AGREEMENTS

Sometimes companies open up their APIs to outside parties and developers without first getting an agreement in place. This is called "*going naked*." Going naked occurs though intentional strategy and design ("let's leave things open and see what happens"). It can be driven by the financial ("legal is over-rated, we are a young start-up or small importer-exporter, and even if we wanted we can't afford legal to set this up for us"). Or it's driven by a lack of business acumen and experience ("we didn't realize this was an issue").

A. Twitter Case Study

Twitter provides a helpful example highlighting the perils of going naked and how Terms of Service and/or an API Licensing Agreement (sometimes also called a "service level agreement") can help address and mitigate this risk and potential liability that comes with API utilization and development.

Twitter was founded in 2006 by Jack Dorsey and three additional co-founders.[47] While Twitter had an API licensing agreement with outside developers and users in place, in hindsight, it was too broad and overly generous in terms of what outsiders were allowed to do with the Twitter API.

Some of these outside developers and partners started using Twitter's API to compete with and duplicate its interface, thereby causing confusion in

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[46] Ross Mason, *Have you had your Bezos moment? What you can learn from Amazon*, CIO (August 25, 2017), https://www.cio.com/article/3218667/have-you-had-your-bezos-moment-what-you-can-learn-from-amazon.html.

[47] Twitter WIKIPEDIA page, https://en.wikipedia.org/wiki/Twitter.

the marketplace, including trademark issues, and even changing the tweets. Twitter realized it had opened up its API too much, and it needed to quickly restrict what outside API developers were doing with its API. Twitter therefore made the decision to unilaterally change the licensing agreement.

In an email to developers (**Figure 21** – key language shaded in yellow), Twitter laid out the new rules. Essentially, third-party developers were not allowed to compete with Twitter; instead they were mandated to focus on things like data and specific tweet verticals.[48]

Figure 21: Twitter Development Talk, twitter-ap...@googlegroups.com

Hey all, I'd like to give you an update about the state of the Twitter Platform and hopefully provide some much requested guidance.

Since this time last year, Twitter use has skyrocketed. We've grown from 48 million to 140 million tweets a day and we're registering new accounts at an all-time record. This massive base of users, publishers, and businesses is a giant playground for developers to build their own businesses on, and this means the opportunity has grown for everyone.

With more people joining Twitter and accessing the service in multiple ways, a consistent user experience is more crucial than ever. As we talked about last April, this was our motivation for buying Tweetie and developing our own official iPhone app. It is the reason why we have developed official apps for the Mac, iPad, Android and Windows Phone, and worked with RIM on their Twitter for Blackberry app. As a result, the top five ways that people access Twitter are official Twitter apps.

Still, our user research shows that consumers continue to be confused by the different ways that a fractured landscape of third-party Twitter clients display tweets and let users interact with core Twitter functions. For example, people get confused by websites or clients that display tweets in a way that doesn't follow our design guidelines, or when services put their own verbs on tweets instead of the ones used on Twitter. Similarly, a number of third-party

[48] To view the entire email *see* https://groups.google.com/g/twitter-development-talk/c/yCzVnHqHIWo (Ryan Sarver). *See also*, Josh Halliday, *Twitter suspends UberTwitter and Twidroyd apps, citing issues 'affecting many users',* THE GUARDIAN (Feb. 18, 2011), https://www.theguardian.com/technology/blog/2011/feb/18/twitter-digital-media.

consumer clients use their own versions of suggested users, trends, and other data streams, confusing users in our network even more. Users should be able to view, retweet, and reply to @nytimes' tweets the same way; see the same profile information about @whitehouse; and be able to join in the discussion around the same trending topics as everyone else across Twitter.

A Consistent User Experience

Twitter is a network, and its network effects are driven by users seeing and contributing to the network's conversations. We need to ensure users can interact with Twitter the same way everywhere. Specifically:

- **The mainstream consumer client experience**. Twitter will provide the primary mainstream consumer client experience on phones, computers, and other devices by which millions of people access Twitter content (tweets, trends, profiles, etc.), and send tweets. If there are too many ways to use Twitter that are inconsistent with one another, we risk diffusing the user experience. In addition, a number of client applications have repeatedly violated Twitter's Terms of Service, including our user privacy policy. This demonstrates the risks associated with outsourcing the Twitter user experience to third parties. Twitter has to revoke literally hundreds of API tokens / apps a week as part of our trust and safety efforts, in order to protect the user experience on our platform.
- **Display of tweets in 3rd-party services**. We need to ensure that tweets, and tweet actions, are rendered in a consistent way so that people have the same experience with tweets no matter where they are. For example, some developers display "comment", "like", or other terms with tweets instead of "follow, favorite, retweet, reply" - thus changing the core functions of a tweet.

With this in mind, we've updated our Terms of Service: http://dev.twitter.com/pages/api_terms.

The Opportunity for Developers

Developers have told us that they'd like more guidance from us about the best opportunities to build on Twitter. More specifically, developers ask us if they should build client apps that mimic or reproduce the mainstream Twitter consumer client experience. The answer is no.

If you are an existing developer of client apps, you can continue to serve your user base, but we will be holding you to high standards to ensure you do not violate users' privacy, that you provide consistency in the user experience, and that you rigorously adhere to all areas of our Terms of Service. We have spoken with the major client applications in the Twitter ecosystem about these needs on an ongoing basis, and will continue to ensure a high bar is maintained.

As we point out above, we need to move to a less fragmented world, where every user can experience Twitter in a consistent way. This is already happening organically - the number and market share of consumer client apps that are not owned or operated by Twitter has been shrinking. According to our data, 90% of active Twitter users use official Twitter apps on a monthly basis.

In contrast, the number of successful applications and companies in the Twitter ecosystem that focus on areas outside of the mainstream consumer client experience has grown quickly, and this is a trend we want to continue to support and help grow. Twitter will always be a platform on which a smart developer with a great idea and some cool technology can build a great company of his or her own. And, with record user growth, there has never been a better time to build into Twitter.

Some key areas where ecosystem developers are thriving:

- **Publisher tools**. Companies such as SocialFlow help publishers optimize how they use Twitter, leading to increased user engagement and the production of the right tweet at the right time.
- **Curation**. Mass Relevance and Sulia provide services for large media brands to select, display, and stream the most interesting and relevant tweets for a breaking news story, topic or event.
- **Realtime data signals**. Hundreds of companies use real-time Twitter data as an input into ranking, ad targeting, or other aspects of enhancing their own core products. Klout is an example of a company which has taken this to the next level by using Twitter data to generate reputation scores for individuals. Similarly, Gnip syndicates Twitter data for licensing by third parties who want to use our real-time corpus for numerous applications (everything from hedge funds to ranking scores).
- **Social CRM, enterprise clients, and brand insights**. Companies such as HootSuite, CoTweet, Radian6, Seesmic, and Crimson Hexagon help brands, enterprises, and media companies tap into the zeitgeist about their brands on Twitter, and manage relationships with their consumers using Twitter as a medium for interaction.
- **Value-added content and vertical experiences**. Emerging services like Formspring, Foursquare, Instagram, and Quora have built into Twitter by allowing users to share unique and valuable content to their followers, while, in exchange, the services get broader reach, user acquisition, and traffic.

A lot of Twitter's success is attributable to a diverse ecosystem of more than 750,000 registered apps. We will continue to support this innovation. We are excited to be working with our developer community to create a consistent and innovative experience for the many

millions of users who have come to depend on Twitter every day.

As always, we welcome your feedback and questions.

Best, Ryan
@rsarver

There was intense pushback against Twitter's decision, see **Figure 22** below.

Figure 22: Twitter to Devs: Don't Make Twitter Clients … or Else

Fred Oliveira / Helloform:



Dear Twitter, — I never wrote any Twitter clients, but I've been around since the very beginning. So yesterday when I read the news about your new developer roadmap - which boils down to "no new clients, thanks" - I was confused. I was confused because I remember the early days …



Discussion: GigaOM, TechCrunch, Regular Geek, kellabyte and @roosto

RELATED:

Jolie O'Dell / Mashable!:

Twitter to Devs: Don't Make Twitter Clients... Or Else — Pure play Twitter clients — apps like Echofon, Twidroyd and UberTwitter — got a sharp slap on the wrist today from Twitter platform chief Ryan Sarver. — In an API announcement post, Sarver finally made clear what third-party developers …



Discussion: PR Newswire, Examiner, @dannysullivan, Softpedia News, Engadget, Ars Technica, Stowe Boyd and ReadWriteWeb

Jesse Stay / Stay N' Alive:

Twitter is Finally Doing the Right Thing

Discussion: Taptivate, The Next Web, TechnoBuffalo, TechCrunch and Scripting News,

Thanks: jesse

Source: https://www.techmeme.com/110312/p14#a110312p14. *See also* Jolie O'Dell, *Twitter to Devs: Don't Make Twitter Clients … or Else* (Mar. 12, 2011), https://mashable.com/2011/03/12/twitter-api-clients/.

Overall, the new Terms of Service-Agreement were more strongly and directly worded than the prior version. Privacy was also more of a focus. They key change was in the first paragraph:

January 3, 2011 version:

> *We want to empower our ecosystem partners to build valuable **businesses** around the information flowing through Twitter.*

March 11, 2011 version:

> *We want to empower our ecosystem partners to build valuable **tools** around the information flowing through Twitter.*

This language change ("businesses" to "tools") is what angered Twitter's "partners." **Figure 23** below lays out not the full new legal agreement, but the sections with the main **redlined** changes.

Figure 23: Twitter API Terms of Service (Redlined) Changes

Last Update: ~~January 3~~March 11, 2011 Rules of the Road Twitter maintains an open platform that supports the millions of people around the world who are sharing and discovering what's happening now. We want to empower our ecosystem partners to build valuable ~~busiesses~~tools around the information flowing through Twitter. At the same time, we aim to strike a balance between encouraging interesting development and protecting both Twitter's and users' rights. So, we've come up with a set of Developer Rules of the Road ("**Rules**") that describe the policies and philosophy around what type of innovation is permitted with the content and information shared on Twitter. The Rules will evolve along with our ecosystem as developers continue to

innovate and find new, creative ways to use the Twitter API, so please check pack periodically to see the most current version. ~~If you are doing something~~Don't do anything prohibited by the Rules, but talk to us ~~about whether~~if you think we should make a change or give you an exception. ~~I. Access to~~if you will eventually need more than 5MM user tokens for your projects, you will need to talk to us directly about access to the Twitter API.

I. Twitter Content

1. All use of the Twitter API content, documentation, code, and related materials made available to you on or through Twitter ("**Twitter Content**") is subject to and must comply with these Rules. As a reminder, you and your Service are subject to the Twitter- Terms- of Service.

2. You may use the Twitter API and Twitter Content in connection with the products or services you provide (your "**Service**") to search, display, analyze, retrieve, view, and submit information to or on Twitter. You may use the Twitter name or logos and other brand elements that Twitter makes available in order to identify the source of Twitter Content ("**Twitter Marks**") subject to these Rules.

3. Your use of the Twitter API and Twitter Content are subject to certain limitations on access, calls, and use ~~of the Twitter API~~ as set forth in the Rules, on dev.twitter.com, or as otherwise provided to you by Twitter. If Twitter ~~reasonably~~ believes that you have attempted to exceed to circumvent ~~the rate limits~~these limitations, your ability to use the Twitter API and Twitter Content may be temporarily or permanently blocked. Twitter may monitor your use of the Twitter API to improve the Twitter service and to ensure your compliance with these Rules.

4. You will not attempt or encourage others to:

A. sell, rent, lease, sublicense, redistribute, or syndicate access to the Twitter API or Twitter Content to any third party ~~for such party to develop additional products or services~~ without prior written approval from Twitter~~.~~

- If you provide an API that returns Twitter data, you may only return IDs (including tweet IDs and user IDs).
- You may export or extract non-programmatic, GUI-driven Twitter Content as a PDF or spreadsheet by using "save as" or similar functionality. Exporting Twitter Content to a datastore as a service or other cloud based service, however, is not permitted.

B. remove or alter any proprietary notices or marks on the Twitter API or Twitter Content;

C. use or access the Twitter API for purposes of monitoring the availability, performance, or functionality of any of ~~Twitter's~~Twitter's products and services or for any other benchmarking or competitive purposes; or

D. ~~use Twitter Marks as a part of the name of your company or Service, or in any product, service, or logos created by you. You may not~~use Twitter marks in a manner that creates a sense of endorsement, sponsorship, or false association with Twitter. You may not use Twitter Marks as part of the name of your company or Service, or in any product, service, name field or logos created by you. All use of Twitter Marks, and all goodwill arising out of search use, will inure to ~~Twitter's~~Twitter's benefit.

E. use or access the Twitter API to aggregate, cache (except as a part of a Tweet), or store place and other geographic location information contained in Twitter Content.

F. charge a premium for access to tweets via SMS other than your Service's standard data and usage rates.

5. Your Service may be an application or client that provides major components of a Twitter-like end user experience (a "**Client**"). An example of a Client is a downloadable application that displays user timelines and allows users to create and search for tweets. If so, certain additional terms apply, including:

A. Your Client must use the Twitter API as the sole source for features that are substantially similar to functionality offered by Twitter. Some examples include trending topics, who to follow, and

suggested user lists.

B. You may not pay, or offer to pay, third parties for distribution of your Client, This includes offering compensation for downloads (other than transactional fees), pre-installations, or other mechanisms of traffic acquisition.

C. Your client cannot frame or otherwise reproduce significant portions of the Twitter service. You should display Twitter Content from the Twitter API.

D. Do not store non-public user profile data or content.

E. You may not use Twitter Content or other data collected from the end users of your Client to create or maintain a separate status update or social network database or service.

6. You do not have a license to Twitter Content submitted through your Service other than the rights granted in the Rules.

3. Respect user privacy

A. Your Service must display a privacy policy. Clearly disclose what you are doing with information you collect from users.

B. Clearly disclose when you are adding location information to a user's Tweets, whether as a geotag or annotations data. Be clear about whether you are adding a place or specific coordinates. If your application allows users to Tweet with their location be sure that is complies with the best practices found here.

C. Do not solicit another developer's consumer keys or consumer secrets if they will be stored outside of that developer's control. For example, online services that ask for these values in order to provide a "tweet-branding" service are not allowed.

D. Do not facilitate or encourage the publishing or private or confidential information.

4. Be a good partner to Twitter

A. If you display Tweets in an offline context, do so according to the guidelines found here.
B. Respect the features and functionality embedded with or included in Twitter Content or the Twitter API. Do not attempt to interfere with, intercept, disrupt, filter, or disable any features of the Twitter API ~~features~~or Twitter service, and you should only surface actions that are organically displayed on Twitter.
- For example, your Service should execute the unfavorite and delete actions by removing all relevant messaging and Twitter Content, not by publicly displaying to other end users that the Tweet was unfavorited or deleted.

C. If your application causes or induces user accounts to violate the Twitter Rules (for example, by retweeting spam updates, repeatedly posting duplicate links, etc.), it may be suspended or terminated. We've provided some guidance in our Abuse Prevention and Security help page.
D. Respect the intellectual property rights of others.
E. Do not use the Twitter Verified Account status, or any other enhanced user categorization on ~~account~~Twitter Content other than ~~those~~that reported to you by Twitter through the API.
F. Twitter may suspend or revoke access if we believe you are in violation of the Rules or the spirit of these principles. If you are suspended, do not apply for or

register additional API tokens.

V. Other Legal- Terms

1. Termination.

You may terminate any license in these Rules at any time by ceasing your access to the Twitter API and use of any Twitter Content, and deleting all copies of the Twitter API and Twitter Content described below. Twitter may immediately suspend your access to the Twitter API or any Twitter Content (or if necessary, terminate this agreement with you) at any time, and without notice to you if you breach any term or condition in ~~this agreement~~the Rules or otherwise engage in activities that Twitter reasonable determines are likely to cause liability to Twitter. Twitter may also terminate any licenses hereunder for any reason ~~with thirty (30) days notice~~ (including by email to the address associated with your account~~) to you.~~). Twitter will not be liable for any costs, expenses, or damages as a result of its termination of this agreement. Upon termination of this agreement, you will promptly cease accessing and using the Twitter API and Twitter Content and will delete all Twitter Content and any information derived therefrom and all copies and portions thereof, in all forms and types of media from your Service. Sections 1(4) and V of these Rules will survive the termination of this agreement.

4. Updates

Twitter may update or modify the Twitter API, Rules, and other-terms-and conditions, including the Display Guidelines, from time to time its sole discretion by posting the changes on this site or by otherwise notifying you (such notice may be via email). You acknowledge that these updates and modifications may adversely affect how your Service accesses or communicates with the Twitter API. ~~You will have thirty (30) days from such notice to comply with any modifications.~~ If any change is unacceptable to you, your only recourse is to terminate this agreement by ceasing all use of the Twitter API and Twitter Content. Your continued

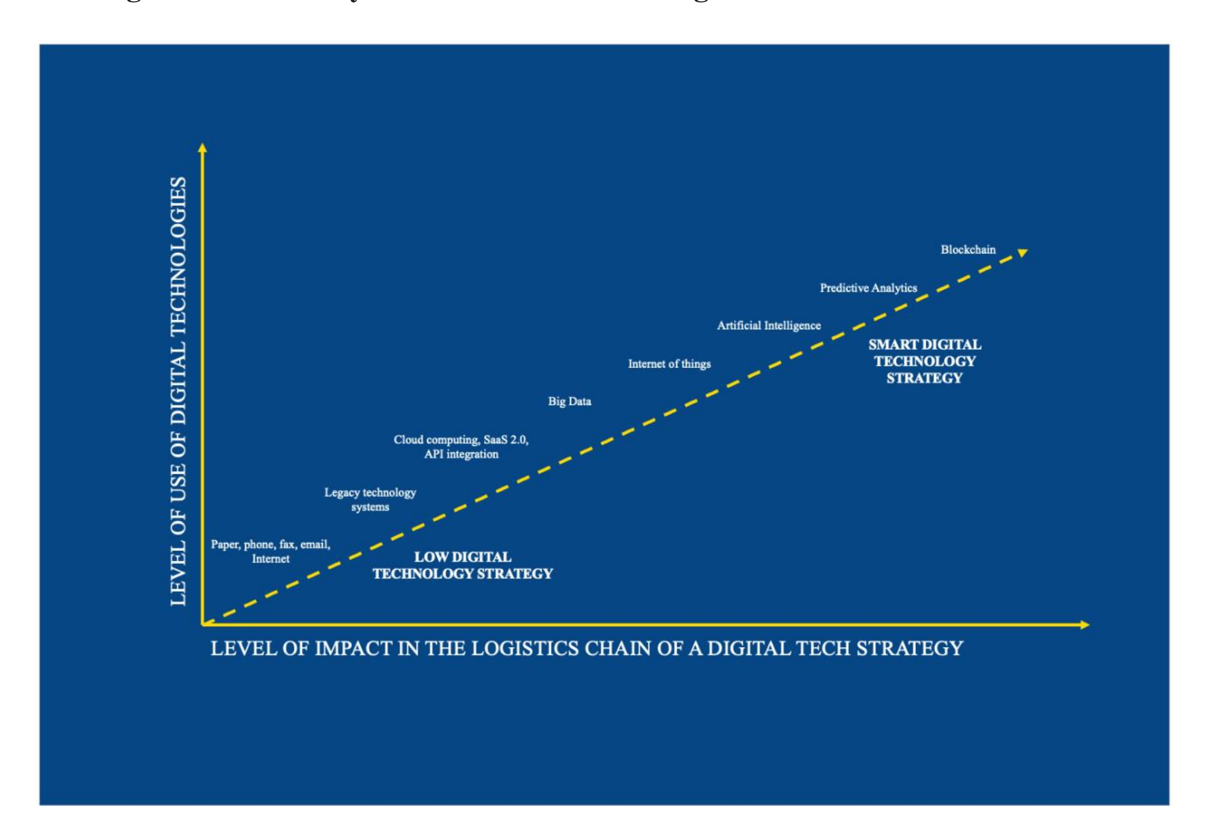
access of the Twitter API or any Twitter Content ~~following the 30 day period~~ will constitute binding acceptance of the change.

Source: MG Siegler, *From "Businesses" To "Tools": The Twitter API ToS Changes*, TECHCRUNCH (Mar. 12, 2011), https://techcrunch.com/2011/03/12/from-businesses-to-tools-the-twitter-api-tos-changes/. From this TechCrunch article we recreated the above Figure 23 excerpt. When we searched Twitter's "*Previous Terms of Service*" history page (https://twitter.com/en/tos/previous), for whatever reason, it appears to have been cleansed of January 2011 and March 2011 versions.

VIII. TAKEAWAYS FOR SMALL AND MEDIUM-SIZED IMPORTERS AND EXPORTERS AND THEIR LOGISTICS PROVIDERS

Collectively, the above discussion highlights that the digital technology landscape and ecosystem in the import/export logistics is evolving and will continue to evolve. Import and export stakeholders and their logistics providers should honestly evaluate where they fall on the digital transformation spectrum (**see Figure 24 below**). They should also consider the steps necessary to move from a low to a smart digital technology strategy. Smart digital strategies require the integration and cooperation of various providers at various nodes in the logistics chain, and the system can only be as strong as its weakest link. The goal, of course, is to create an ecosystem with real-time data sharing and responses. The prudent importer-exporter will also become knowledgeable and involved in projects related to IoT, artificial intelligence, predictive analytics, and blockchain.

Figure 24: Industry and Individual Firm Digital Transformation



Second, for the benefit of small and medium-sized importers and exporters, their logistics providers, and legal counsel (in-house or outside), this article laid out the current logistics digital technology landscape, its fragmentation and evolution, and the various stakeholders capable of supplying visibility data to that ecosystem. It also discussed how APIs can be leveraged to help mitigate technology isolation, including how to manage related legal risk through Terms of Service and API License Agreements. Regarding the specifics for how to proceed, each importer-exporter will differ in its priorities and the choices it needs to make to implement its digital technology strategy.

Third, Terms of Service and API License Agreements can obviously benefit or disadvantage, depending on whether one is the API provider or API consumer. Regardless, such agreements are important because the API environment and circumstances will likely change, and when it does so such agreements help protect data providers in particular, should changes need to be made to the type of access outsiders have to the API or to the API itself. Such agreements also allow the API provider/owner to set the expectations and standards it has for applications developed by third parties. Further, learning from the Twitter case study and controversy, strong Terms of Service and API License Agreements will contain terms that permit the provider to unilaterally amend the agreement at any time, as well as appropriate limitations on liability and damages connected to those changes. They should also contain favorable dispute resolution clauses (choice of law, choice of forum and venue, and ADR vs. litigation). **For a helpful logistics-specific example, please refer to the VesselFinder.com case study and discussion provided in Appendix A**.

IX. CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

Small and medium-sized importers, exporters, their internal IT staffs, logistics providers, and the attorneys who advise them are entering a period of dynamic and fundamental change as it relates to the logistics industry. The communication and collaborative aspects of the Internet are changing the way stakeholders develop their logistics strategies, processes and systems. Internet and digital technologies help facilitate information sharing and logistics synchronization between trading partners and service providers. Stakeholders that embrace this paradigm and the opportunity it presents can minimize operating costs, achieve better supply chain integration, and increase market power through customer-focused fulfillment. The contribution of this research and article is to highlight the dispersion and fragmentation of digital technologies as it impacts small and medium-sized importers-exporters, and how API usage can help mitigate a portion of the freight-technology-logistics disconnect.

> *Our philosophy is that we want to be an ecosystem. Our philosophy is to empower others to sell, empower others to*

> *service, making sure the other people are more powerful than us. With our technology, our innovation, our partners - 10 million small business sellers – they can compete with Microsoft and IBM.*
>
> - *Jack Ma, CEO of Alibaba*

One area for further research is the creation of a practical framework focused specifically on small and medium-sized importers and exporters so that they can better understand, plan and navigate the new digital technology ecosystem. Specifically, what should the key elements (the "what") and enablers (the "how") of that framework be? How can that framework accelerate API adoption? What does the training and education to support this effort need to look like (content)? Who should deliver it? How can this framework and movement be designed so that it is of interest and value to not just to importers and exporters but the 3PLs, truckers, chassis providers, ocean carriers, and port and marine terminal entities they collaborate with?

> *IT is fine, but it does not solve broken supply chains.*
>
> - *Senior Analyst at a company that provides data to the maritime, shipping and commodities sectors*

Second, to efficiently function the logistics chain requires:

- Sufficient physical assets and infrastructure located in the right place at the right time (trucks, chassis, containers, vessels, port and terminal facilities and infrastructure, gates, warehouses, rail lines and ramps, inland ports/depots, transloading facilities, and more);
- Labor and human capital inputs, also in the right place at the right time (truckers, drayage operators, stevedores, equipment operators, warehouse personnel, organized labor at the terminals, vessel crews, customs and inspections officers, and more); and
- Technology solutions that affordably connect and efficiently manage these assets and inputs.

However, in the current "Great Supply Chain Disruption" we are running out of ships, ports, terminals, trains, container stacks, chassis, trucks, warehouses and other "places" to put things. What once seemed like a temporary phenomenon increasingly appears to be the new reality that will require a substantial re-think of our supply chains and infrastructure.

Stated differently, is logistics and transportation in the U.S. doomed to a Sisyphean fate?

If there are 80+ vessels anchored or drifting outside the Ports of Los Angeles and Long Beach waiting to berth,[49] what good is technology or the use of APIs to help mitigate such congestion? If a new TMS offers a 10 percent savings in annual costs in transportation spending, does it even matter when freight rates are up 200, 300 or 400 percent? What good is the newest container spot rate search engine and the APIs that connect to it, if the average price to move a loaded container from Yantian to the Port of LA is up from US$1,500 to US$23,000+? What good is technology driven automation if containers within a terminal need to be piled five high to accommodate port congestion, making it harder for cranes to sort through the towers to find the needed boxes when trucks arrive to take them away? Do we need more and/or larger distribution centers? Until autonomous vehicles become the norm, where do we find enough drivers and support people, such as mechanics? And how or why does technology make any sense to discuss or factor in when we have no national import-export, logistics and infrastructure policy?[50]

While digital technology and deeper API usage and integration can help mitigate current supply chain congestion, it is not a panacea. Thus, maybe we

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[49] Dani Anguiano, *A record number of cargo ships are stuck outside LA. What's happening?* THE GUARDIAN (Sept. 23, 2021), https://www.theguardian.com/us-news/2021/sep/22/cargo-ships-traffic-jam-los-angeles-california.

[50] Eric Johnson of the *Journal of Commerce* makes a similar point. *See* Eric Johnson, *Does Tech Matter Among Freight Rate Chaos?*, THE LOGTECH LETTER (Sept. 3, 2021), https://ericjohnson.substack.com/p/does-tech-matter-amid-freight-rate.

need to accept the fact that we are out of space at LA/Long Beach, and another West Coast port may be needed. Or, that gross weight limits on trucks using the roads, freeways or streets in and out of ports should be drastically increased. Why not make it easier for returning military veterans who drove large equipment in Afghanistan or the Middle East to obtain their commercial trucking license upon their return to the U.S., so that the use of such talent is not wasted or delayed? Or, how do we make it easier and more affordable for chassis manufacturing to return to the U.S.?

Clearly, further research is needed that explores what the right "mix" of infrastructure, human capital, and technology should be.

Appendix A: VesselFinder Logistics Example

(Including Terms of Service and API Licensing Agreement)

VesselFinder, a Bulgarian startup founded in 2011, provides information about the current position of ships transmitted by AIS, their past track/route, technical specifications, port and ship photos, port calls, port traffic statistics, maritime news, and other related information.

Assume you are a shipper from the California Central Valley exporting almonds and pistachios (or its third party logistics provider or trucking company). You rely heavily on the data provided by VesselFinder to decide when to instruct your truckers to drive to and arrive at the Port of Oakland, Los Angeles or Long Beach to drop off your export containers for loading onto the designated ocean carrier. Further assume that you have not yet API integrated VesselFinder into/with your own TMS. This means you need to continually log on and check several mobile or desktop screens for this information, because no API integration has been established. I.e., you will have to check your own TMS screen as well as VesselFinder's site. Doing this several times a day, spread out over multiple truckers, is inefficient and inconvenient (especially for the truckers).

You learned from a colleague at an industry meeting that one can easily API integrate VesselFinder's data directly into one's own TMS, thereby building a single, efficient digital platform for employees (and truckers) to access and utilize. To do this you will need to:

1. *Select an API*
2. *Get the API key*
3. *Review the API documentation*
4. *Write a request to an endpoint*
5. *Connect your application*

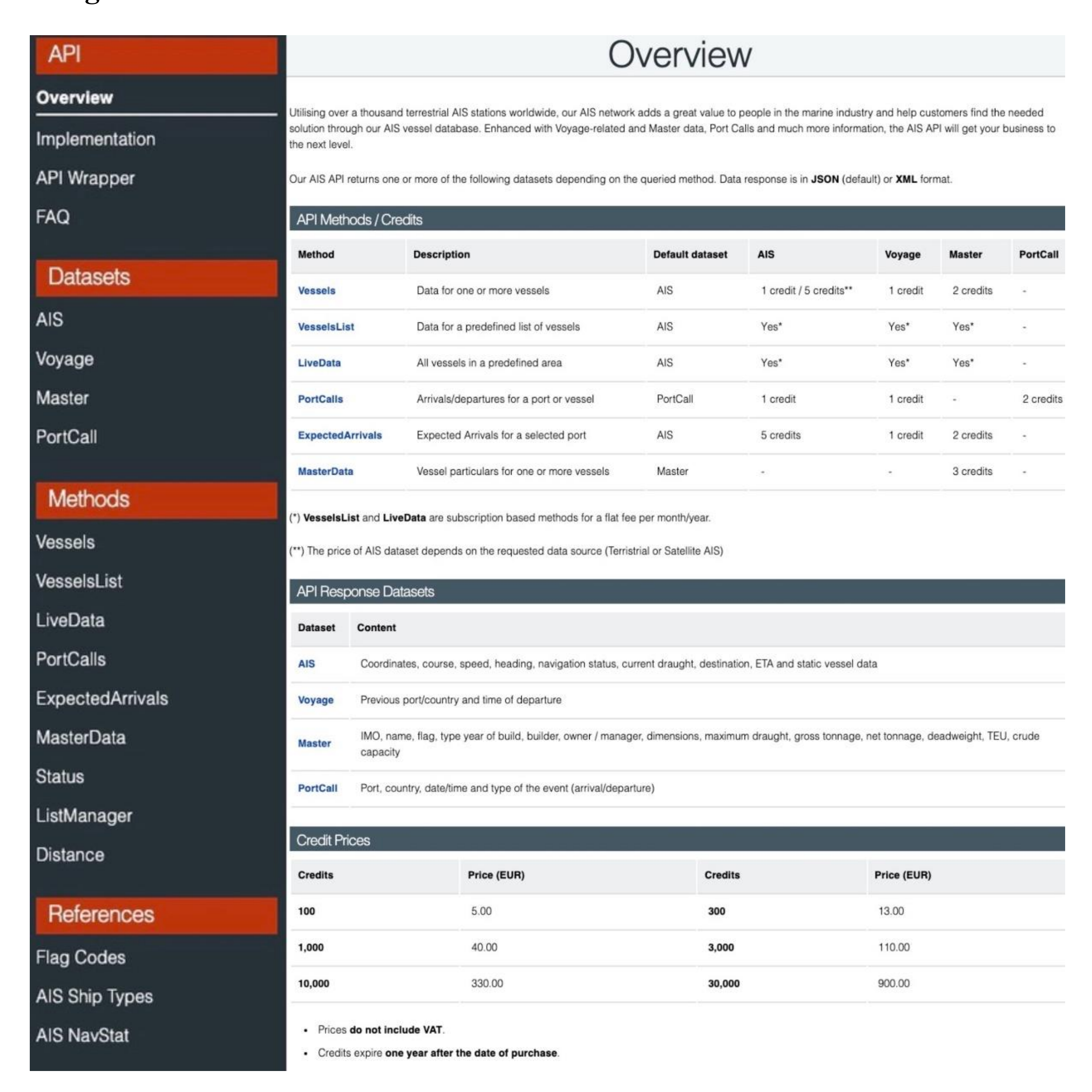
Image 1 below is the information on VesselFinder's website designed to help your IT developer accomplish the above five steps. If you like what you

see and wish to receive or purchase that data, you will also need to register with VesselFinder, and provide your unique identifier and payment information. If approved, your journey to make use of its APIs and data can begin. **Image 2** is VesselFinder's website Terms of Use (Service). A close read confirms its adherence to the contract language recommendation discussed earlier in Section VIII, and it obviously heavily favors VesselFinder (the data provider). Should you wish to establish an agreement with VesselFinder that differs from its Terms of Use, **Image 3** is the starting point and data license-agreement to help start those discussions and negotiation. Note that Bulgaria is a civil law country, so much of the content common law lawyers would say is missing from the below agreement would be handled and filled in by Bulgarian or EU civil codes, not the lengthy contract language often seen in contracts from common law countries such as the United States.[51]

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[51] *See* Kenneth Adams, *Civil-Law Drafting Compared to Common Law Drafting*, ADAMS ON CONTRACT DRAFTING (Nov. 24, 2006), https://www.adamsdrafting.com/civil-law-and-common-law-drafting/ and Kenneth Adams & Jan Asmus Bischoff, *Common-Law Drafting in Civil- Law Jurisdictions*, ABA BUSINESS LAW TODAY (Dec. 20, 2019), https://businesslawtoday.org/2019/12/common-law-drafting-civil-law-jurisdictions/.

Image 1[52]



API

Overview

Implementation

API Wrapper

FAQ

Datasets

AIS

Voyage

Master

PortCall

Methods

Vessels

VesselsList

LiveData

PortCalls

ExpectedArrivals

MasterData

Status

ListManager

Distance

References

Flag Codes

AIS Ship Types

AIS NavStat

Overview

Utilising over a thousand terrestrial AIS stations worldwide, our AIS network adds a great value to people in the marine industry and help customers find the needed solution through our AIS vessel database. Enhanced with Voyage-related and Master data, Port Calls and much more information, the AIS API will get your business to the next level.

Our AIS API returns one or more of the following datasets depending on the queried method. Data response is in **JSON** (default) or **XML** format.

API Methods / Credits

Method	Description	Default dataset	AIS	Voyage	Master	PortCall
Vessels	Data for one or more vessels	AIS	1 credit / 5 credits**	1 credit	2 credits	-
VesselsList	Data for a predefined list of vessels	AIS	Yes*	Yes*	Yes*	-
LiveData	All vessels in a predefined area	AIS	Yes*	Yes*	Yes*	-
PortCalls	Arrivals/departures for a port or vessel	PortCall	1 credit	1 credit	-	2 credits
ExpectedArrivals	Expected Arrivals for a selected port	AIS	5 credits	1 credit	2 credits	-
MasterData	Vessel particulars for one or more vessels	Master	-	-	3 credits	-

(*) **VesselsList** and **LiveData** are subscription based methods for a flat fee per month/year.

(**) The price of AIS dataset depends on the requested data source (Terristrial or Satellite AIS)

API Response Datasets

Dataset	Content
AIS	Coordinates, course, speed, heading, navigation status, current draught, destination, ETA and static vessel data
Voyage	Previous port/country and time of departure
Master	IMO, name, flag, type year of build, builder, owner / manager, dimensions, maximum draught, gross tonnage, net tonnage, deadweight, TEU, crude capacity
PortCall	Port, country, date/time and type of the event (arrival/departure)

Credit Prices

Credits	Price (EUR)	Credits	Price (EUR)
100	5.00	300	13.00
1,000	40.00	3,000	110.00
10,000	330.00	30,000	900.00

- Prices **do not include VAT**.
- Credits expire **one year after the date of purchase**.

[52] Image 1 Source: API Overview page from the VesselFinder.com website, https://api.vesselfinder.com/docs/.

Image 2

Terms of Use

By using the VesselFinder.com website, our mobile applications, premium services or other information provided as part of the VesselFinder services (collectively “VesselFinder” or the “Service”), you are entering into a legally binding agreement with VesselFinder Limited, based on the terms below and the VesselFinder Privacy Policy (collectively referred to as the “Terms”) in full. If you do not agree to these Terms or any part of these Terms, you do not have the right to access or use our Service. If you do use our Service, your use shall be deemed to confirm your acceptance of the Terms and your agreement to be a party to this binding contract.

(1) Introduction

VesselFinder provides information about current position of ships transmitted by AIS, their past track, technical specifications, port and ship photos, port calls, port traffic statistics, maritime news and other related information.

(2) Use of Services

Registered users of VesselFinder.com are able to use certain additional services and extra data. During your registration you will be asked to provide your name and e-mail address, which will be deemed to be of your own exclusive property or in your legitimate possession or use.

The users who subscribe to our Services are considered as adults and able to act legally.

(3) Licence to use website

Unless otherwise stated, we or our licensors own the intellectual property rights in the Service and material on VesselFinder. Subject to the licence below, all these intellectual property rights are reserved and protected by European law. You may view, download for caching purposes only, and print pages, photos, news, data and all other information from the Service for your own personal use, subject to the restrictions set out below and elsewhere in these Terms. You must not:

- republish material from this website (including republication on another website) without appropriate accreditation to VesselFinder.com or a backlink to www.vesselfinder.com;
- sell, rent or sub-license material from the website;
- show any material from the website in public without mentioning VesselFinder.com as a source;

- reproduce, duplicate, copy or otherwise exploit material on our website for a commercial purpose;
- redistribute material from this website except for content specifically and expressly made available for redistribution.

Where content is specifically made available for redistribution, it may only be redistributed within your organisation.
The information on our website is provided by our data providers, partners or contributors and VesselFinder is not liable for its accuracy and genuineness.

(4) Paid Services

Certain Services from VesselFinder are offered free of charge, currently called the "Free Service". Other Services require payment before you can access them, collectively called "Paid Services". You can learn more about the content of our Paid Services on our Website.

Paid Services are entered into for a subscription period. The subscription period may be either for one (1) month at a time, for twelve (12) months at a time or for such period agreed upon between the Parties. All subscriptions (personal and business) are not automatically extended. Please see your account page at our Website for more information about your subscription.

No logging in on more than one device is allowed at the same time with one account. Each paid user is allowed to log in to their account on one (1) device/browser at a time.

You acknowledge that a variety of VesselFinder actions may impair or prevent you from accessing your Content or using the Service at certain times and/or in the same way, for limited periods or permanently, and agree that VesselFinder has no responsibility or liability as a result of any such actions or results, including, without limitation, for the deletion of, or failure to make available to you, any Content. If you are a subscriber to the Paid Services and find that any such modifications or interruption of the Paid Services adversely affects you, you may notify us, explain the adverse impact the modification has created and, if you desire, request a termination of your Paid Services. Upon receipt of any such request, we will endeavor to promptly remedy the adverse impact caused by the modification, by extending the duration of your Paid Services subscription for a period of time equal to the interruption and/or by refunding you any prepaid fees for the remainder of the relevant Subscription calculated from the moment of such withdrawal.

(5) Fees and Payment

Paid Services shall be paid as a monthly or yearly subscription fee in accordance with the price which is available on the Website or in one of our mobile applications. You may

effect payment of the fee through any of the means of payment offered by us on the Website or in one of our mobile applications. If any payment is not made on the due date, your Paid Service subscription will be automatically and immediately terminated.

VesselFinder may change the prices for the Paid Services from time to time and will indicate any such price changes on our Website. Price changes to Paid Services will take effect from the next subscription period (one or twelve months, see above). As permitted by law, you accept the new price by renewing your subscription to the Paid Services at the new prices. If you do not agree with the price changes, you have the right not to renew your subscription.

We work with a third-party company, Avangate BV dba 2Checkout ("Avangate"), which is processing all electronic payments for our Paid Services. By subscribing to our Paid Services you consent third-party processing partners to store your payment card information. Avangate and its Affiliates companies part of the Avangate - 2Checkout group of companies dba 2Checkout, addresses the compliance obligations imposed upon them pursuant to the Directive 95/46/EC ("GDPR"), California Consumer Privacy Act of 2018 ("CCPA") and any other applicable privacy laws.

(6) Acceptable use

You must not use our website in any way that causes, or may cause, damage to the website or impairment of the availability or accessibility of the website; or in any way which is unlawful, illegal, fraudulent or harmful, or in connection with any unlawful, illegal, fraudulent or harmful purpose or activity. You must not use our website to copy, store, host, transmit, send, use, publish or distribute any material which consists of (or is linked to) any spyware, computer virus, Trojan horse, worm, keystroke logger, rootkit or other malicious computer software. You must not conduct any systematic or automated data collection activities (including, without limitation, scraping, data mining, data extraction and data harvesting) on or in relation to our website without our express written consent. You must not use our website to transmit or send unsolicited commercial communications.

(7) Restricted access

Access to certain areas of our website is restricted. We reserve the right to restrict access to other areas of our website, or indeed our whole website, at our discretion. If we provide you with / you generate a user email address and password to enable you to access restricted areas of our website or other content or services, you must ensure that the password is kept confidential. You must notify us in writing immediately if you become aware of any unauthorised use of your account or password. You are responsible for any activity on our website arising out of any failure to keep your password confidential and may be held liable for any losses arising out of such a failure. You must not use any other person's email address and password to access our website, unless you have that person's

express permission to do so. We may disable your user email address and password at any time in our sole discretion with or without notice or explanation.

(8) User content

In these Terms, "your content" means material (including, without limitation, text, images, data, audio material, video material and audio-visual material) that you submit to our website, for whatever purpose. You grant to us a worldwide, irrevocable, non-exclusive, royalty-free licence to use, reproduce, adapt, publish, translate and distribute your content in any existing or future media. You also grant to us the right to sub-license these rights and the right to bring an action for infringement of these rights. You warrant and represent that your content will comply with these terms of use. Your content must not be illegal or unlawful, must not infringe any third party's legal rights and must not be capable of giving rise to legal action whether against you or us or a third party (in each case under any applicable law). You must not submit any content to the website that is or has ever been the subject of any threatened or actual legal proceedings or other similar complaint. We reserve the right to edit or remove any material submitted to our website, or stored on our servers, or hosted or published upon our website. If any content is deemed to be copyright infringing, you can let us know sending us an email to info@vesselfinder.com. Upon notification of violations, we may remove such content immediately if found for violating these Terms or copyright infringing. Notwithstanding our rights under these Terms in relation to your content, we do not undertake to monitor the submission of such content to, or the publication of such content on, our website. All information and data that you share on www.vesselfinder.com is visible on the website can be found and seen from anyone and we are not responsible for whatever purposes the third party might use it for, so you are warned and agree with this.

(9) Limited warranties

The information provided by VesselFinder is for general informational purposes only. All information on VesselFinder is provided in good faith, however we make no representation or warranty of any kind, express or implied regarding the accuracy, adequacy, validity, reliability, availability or completeness of any information on VesselFinder. We do not commit to ensuring that the Service remains available or that the material on the VesselFinder is kept up to date. To the maximum extent permitted by applicable law, we exclude all representations, warranties and conditions relating to this website and the use of this website (including, without limitation, any warranties implied by law in respect of satisfactory quality, fitness for purpose and/or the use of reasonable care and skill).

(10) Limitations and exclusions of liability

Nothing in these terms of use will:

- limit or exclude our or your liability for death or personal injury resulting from negligence;
- limit or exclude our or your liability for fraud or fraudulent misrepresentation;
- limit any of our or your liabilities in any way that is not permitted under applicable law;
- or exclude any of our or your liabilities that may not be excluded under applicable law.

The limitations and exclusions of liability set out in this Section and elsewhere in these terms of use: (a) are subject to the preceding paragraph; and (b) govern all liabilities arising under these terms of use or in relation to the subject matter of these terms of use, including liabilities arising in contract, in tort (including negligence) and for breach of statutory duty. To the extent that the website and the information and services on the website are provided free of charge, we will not be liable for any loss or damage of any nature.

- We will not be liable to you in respect of any losses arising out of any event or events beyond our reasonable control.
- We will not be liable to you in respect of any business losses, including (without limitation) loss of or damage to profits, income, revenue, use, production, anticipated savings, business, contracts, commercial opportunities or goodwill.
- We will not be liable to you in respect of any loss or corruption of any data, database or software.
- We will not be liable to you in respect of any special, indirect or consequential loss or damage.

(11) Indemnity

You hereby indemnify us and undertake to keep us indemnified against any losses, damages, costs, liabilities and expenses (including, without limitation, legal expenses and any amounts paid by us to a third party in settlement of a claim or dispute on the advice of our legal advisers) incurred or suffered by us arising out of any breach by you of any provision of these Terms, or arising out of any claim that you have breached any provision of these Terms.

(12) Breaches of these terms of use

Without prejudice to our other rights under these Terms, if you breach these Terms in any way, we may take such action as we deem appropriate to deal with the breach, including suspending your access to the website, prohibiting you from accessing the website, blocking computers using your IP address from accessing the website, contacting your internet service provider to request that they block your access to the website and/or bringing court proceedings against you.

(13) Variation
We may revise these Terms from time to time without notice. Revised terms of use will apply to the use of our website from the date of publication of the revised terms of use on our website. Continued use of our Services after such changes shall constitute your consent to these changes.

(14) Assignment
We may transfer, sub-contract or otherwise deal with our rights and/or obligations under these terms of use without notifying you or obtaining your consent. You may not transfer, sub-contract or otherwise deal with your rights and/or obligations under these terms of use.

(15) Severability
If a provision of these terms of use is determined by any court or other competent authority to be unlawful and/or unenforceable, the other provisions will continue in effect. If any unlawful and/or unenforceable provision would be lawful or enforceable if part of it were deleted, that part will be deemed to be deleted, and the rest of the provision will continue in effect.

(16) Exclusion of third party rights
These Terms are for the benefit of you and us, and are not intended to benefit any third party or be enforceable by any third party. The exercise of our and your rights in relation to these Terms is not subject to the consent of any third party.

(17) Entire agreement
Subject to the first paragraph of Section [8], these terms of use, together with our Privacy Policy, constitute the entire agreement between you and us in relation to your use of our website and supersede all previous agreements in respect of your use of our website.

(18) Law and jurisdiction
These terms of use will be governed by and construed in accordance with Bulgarian law, and any disputes relating to these terms of use will be subject to the non-exclusive jurisdiction of the court of the Republic of Bulgaria.

(19) Our details
The full name of our company is VesselFinder Limited
You can contact us by email to info@vesselfinder.com.

Image 2 Source: VesselFinder Terms of Use (as of Oct. 12, 2021), https://www.vesselfinder.com/terms.



VESSELFINDER LTD
VAT ID: BG203382646
Business centre, Hadzhi Dimitar sqr
Sliven 8800, Bulgaria

Phone: +359 877 731 576
E-mail: info@vesself nder.com
Web: www.vesself nder.com

AIS DATA LICENSE AGREEMENT

No 0001121 / 10.08.2021

BETWEEN: **VESSELFINDER LTD**, a company organized and exist ng under the laws of Bulgaria, with its head of ce located at: **Business centre f . 5, Hadzhi Dimitar square, 8800 Sliven Bulgaria**, EU VAT Number **BG203382646**, phone: **+359 877 731 576**, e-mail: **info@vesself nder.com** represented by Peter Stoyanov – Managing Director (hereinaf er referred to as "**PROVIDER**")

AND: **COMPANY NAME**, a company organized and exist ng under the laws of XXXXXXXX, with its registered of ce located at: XXXXXXXXXXX**,** EU VAT Number XXXXXXXX. (hereinaf er referred to as "**CLIENT**")

Part es agree to the following:

1 - PURPOSE AND DURATION OF AGREEMENT

1.1 The purpose of this Agreement is to def ne the terms and condit ons for the provision and license of **AIS (Automated Ident f cat on System) data supply** as further detailed in clause 2 below (hereinaf er referred to as "**Data**") between PROVIDER and CLIENT.

1.2 This Agreement will be ef ect ve from **DateXXXX to DateXXXX**, and shall be automat cally renewed for a further period of **twelve (12)** months unt l or unless either party gives one (1) month advance writ en not ce of terminat on.

2 – SUPPLY OF DATA

2.1 PROVIDER grants the CLIENT access to real-t me AIS data in XML/JSON format through its API method "VesselsList" with the following parameters:
- data for an area with coordinates: XXXX
- maximum request interval: 1 per hour

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2.3 Vessel positions data will be provided in **one-hour interval** and each record will contain the following values: IMO, MMSI, TIMESTAMP, LONGITUDE ,LATITUDE, COURSE, SPEED, HEADING, VESSEL NAME, CALLSIGN, VESSEL AIS TYPE, DISTANCE TO BOW, DISTANCE TO STERN, DISTANCE TO PORT, DISTANCE TO STARBOARD, DRAUGHT, DESTINATION, ETA

2.4 PROVIDER will provide access to the Data not later than **5 (five) business days** after the receipt of payment as given in claue 4.1.

3 – LICENSE AND DATA USE

3.1 PROVIDER hereby grants to the CLIENT a non-exclusive, non-transferable, irrevocable, worldwide, royalty-free, perpetual licence to use the Data both internally and externally for any purpose.

3.2 Without limitation to Clause 3.1 above, PROVIDER agrees that the CLIENT may use, process and analyse the Data and provide or sell outputs from processing/analysis to third parties.

4 – FEES AND PAYMENTS

4.1 CLIENT agrees to pay PROVIDER **monthly/one time fee of XXXX EUR (in words)** for the Data provided by PROVIDER in accordance with this Agreement.

4.2 All invoices are due and payable by CLIENT **30 (thirty) days** after the invoice date.

5 – ERROR OR INACCURACY

5.1 The Data provided by PROVIDER is assembled from data sent by vessels' AIS systems and received in part by the PROVIDER's own receivers, in part by third party providers. These sources are believed to be reliable by PROVIDER but PROVIDER is unable to guarantee the accuracy of all details.

5.2 The Data is provided on an "as is" basis. PROVIDER gives or makes no representation or warranty (either express or implied) as to the completeness, accuracy or reliability of the Data, save that the



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use of the Data by the CLIENT in the manner set out in this Agreement will not infringe the rights of any third party.

6 – LIMITATION OF LIABILITY

6.1 PROVIDER is not liable for any indirect loss, damage, claim, expense, cost or liability whatsoever (including in contract, tort including negligence, pursuant to statute and otherwise) arising in respect of or in connection with this Agreement, including from your use (including reliance upon) or non-use of the Data.

6.2 CLIENT releases and indemnifies PROVIDER from and against all losses, costs or liabilities suffered or incurred by CLIENT, its directors, officers, employees, agents or contractors as a result of their use of the Data or any disclosure of the Data to a third party.

7 – FORCE MAJEURE

7.1 Neither party will be liable for its inability or delay in performing any of its obligations under this Agreement if such inability or delay is caused by an event which is beyond that party's reasonable control (a "force majeure event").

7.2 If the occurrence of a force majeure event prevents a party from performing its obligations:
(a) the non-performing party will notify the other party in writing; and
(b) this Agreement will be suspended from the date of the force majeure event and will resume on the day on which the event giving rise to the suspensions ceases.

7.3 This Agreement may be terminated by either party on giving written notice to the other party of its intention to terminate if the force majeure event continues for a period of 30 days or more.

8 – GENERAL

8.1 Changes, amendments and side letters to this Agreement have to be in writing in order to have any legal effect.

8.2 This agreement is exclusively governed by the laws of the Republic of Bulgaria under exclusion of Private International Law.



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8.3 The Agreement shall entry into force upon its signature by both parties.

Signed on behalf of the PROVIDER:

Agreed and accepted

Signature: ____________________

Name: ____________________

Title: ____________________

Date: ____________________

Signed on behalf of CLIENT:

Agreed and accepted

Signature: ____________________

Name: ____________________

Title: ____________________

Date: ____________________

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Image 3 Source: This contract/agreement was provided to the authors by VesselFinder staff via email request.